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II. *Computation of the Lengths of the Waves of Light corresponding to the Lines in the Dispersion Spectrum measured by KIRCHHOFF.* By GEORGE BIDDELL AIRY, *Astronomer Royal.*

Received March 2,—Read March 21, 1867.

THE greatest and most valuable system of measures which we possess of the lines in the Dispersion Spectrum, produced by the emanation of light from the Sun, by transmission through the Atmosphere, and by the combustion of Metals, is that published by Professor KIRCHHOFF in the Memoirs of the Berlin Academy for 1861 and 1862. This noble series includes about 1600 lines, taken in uninterrupted succession through the spectrum, beginning a little before FRAUNHOFER'S line A and ending a little after G. The same apparatus was used throughout, and in the same manner; and the system followed in the whole process was so nearly constant that we may speak of it generally as one consistent series of measures. This work has been made known to English readers by an accurate translation published by Professor ROSCOE.

The measures thus exhibited depend upon the form of the apparatus, the refractive and dispersive powers of the glass, the nature of the scale employed, and the value of its unit of measure. They are not therefore available for physical research, until they are cleared of the effects of these circumstances of experiment. There can be no hope of our arriving at, or even commencing, any mechanical theory on the formation of the spectral lines, until we have obtained the one natural measure of each, namely the length of the Wave of Light corresponding to each.

I have therefore undertaken the labour of computing from each spectral measure the corresponding length of the Wave of Light; and I trust that the result may not be unacceptable to the Royal Society.

I will now describe the method which I have used.

When I commenced this work, I could not learn (although I made inquiries) that any careful measures had been made of the Diffraction Spectrum since the original measures of FRAUNHOFER. I therefore determined to make FRAUNHOFER'S measures of the principal lines the basis of my computations. From GILBERT'S 'Annalen der Physik und der Physikalischen Chemie,' XIV. Band, Leipzig 1823, page 559, I took the following values of the Length of a Wave, omitting the value for B, which apparently was not determined in the same series of measures with the others:—

|        |   |                                      |   |             |
|--------|---|--------------------------------------|---|-------------|
| $FR_C$ | = | Length of wave for C, in Paris inch, | = | 0·00002422, |
| $FR_D$ | = | „ „ D „                              | = | 0·00002175, |
| $FR_E$ | = | „ „ E „                              | = | 0·00001945, |

$$\begin{aligned} \text{FR}_F &= \text{Length of wave for F, in Paris inch,} = 0.00001794, \\ \text{FR}_G &= \text{,, ,, G ,,} = 0.00001587. \end{aligned}$$

The lines are not designated, in KIRCHHOFF'S tables of measures, by the received letters; the letters, however, as well as KIRCHHOFF'S scale-numbers, are attached to his engravings of the spectrum, which appear to be carefully drawn. From these I took the following numbers:—

$$\begin{aligned} K_C &= \text{KIRCHHOFF'S scale-measure for C} = 694.1, \\ K_D &= \text{,, ,, D} = 1004.8, \\ K_E &= \text{,, ,, E} = 1527.7, \\ K_F &= \text{,, ,, F} = 2080.0, \\ K_G &= \text{,, ,, G} = 2854.3. \end{aligned}$$

The next step was to construct a formula, which, when applied to KIRCHHOFF'S values for C, D, E, F, G, should produce FRAUNHOFER'S values for the same lines. I know no physical reason for adopting one formula in preference to another; and I therefore adopted the simplest algebraical formula. Putting  $k_i = \frac{1}{1000} K_i$ , and  $f_i = 100000000 \times \text{FR}_i$ , I assumed

$$f_i = a + b \cdot k_i + c(k_i)^2 + d(k_i)^3 + e(k_i)^4,$$

and formed five equations numerically by putting successively on the left side  $f_C, f_D, \&c.$ , and on the right side  $k_C, k_D, \&c.$ , giving to those symbols the numerical values derived from the small tables above. Solving the equations, I found

$$\begin{aligned} f_i &= 3596.688 \\ &\quad - 2582.018 \times k_i \\ &\quad + 1587.046 \times (k_i)^2 \\ &\quad - 476.676 \times (k_i)^3 \\ &\quad + 52.959 \times (k_i)^4. \end{aligned}$$

From this formula, values of  $f_i$  and  $\text{FR}_i$  were tabulated for every 0.01 of  $k_i$ , or for every 10.0 of KIRCHHOFF'S scale. It will be sufficient to give here every tenth number.

| Kirchhoff. | Fraunhofer.<br>in.<br>0.0000 | Kirchhoff. | Fraunhofer.<br>in.<br>0.0000 | Kirchhoff. | Fraunhofer.<br>in.<br>0.0000 |
|------------|------------------------------|------------|------------------------------|------------|------------------------------|
| 0          | 35967                        | 1000       | 21780                        | 2000       | 18148                        |
| 100        | 33539                        | 1100       | 21199                        | 2100       | 17888                        |
| 200        | 31400                        | 1200       | 20697                        | 2200       | 17625                        |
| 300        | 29525                        | 1300       | 20262                        | 2300       | 17358                        |
| 400        | 27887                        | 1400       | 19879                        | 2400       | 17087                        |
| 500        | 26462                        | 1500       | 19538                        | 2500       | 16814                        |
| 600        | 25227                        | 1600       | 19229                        | 2600       | 16539                        |
| 700        | 24162                        | 1700       | 18942                        | 2700       | 16269                        |
| 800        | 23244                        | 1800       | 18671                        | 2800       | 16007                        |
| 900        | 22456                        | 1900       | 18407                        | 2900       | 15760                        |
|            |                              |            |                              | 3000       | 15535                        |

Between the numbers computed for every 10.0 of KIRCHHOFF'S scale, the numbers were interpolated for every one of KIRCHHOFF'S line-measures by simple proportion of

first differences. Thus I had a complete table of the values of the length of the wave of light expressed in Paris inches for every one of KIRCHHOFF'S lines. Each number was then multiplied by 27·0700, and thus I had a complete table of the values of the length of the wave of light expressed in millimetres for every one of KIRCHHOFF'S lines. In this state I very carefully revised all the final numbers. This is the table of results now offered to the Royal Society. It did not appear necessary to publish a long series of results expressed by a measure which is now so nearly obsolete as the Paris inch; although, as will appear below, the possession of those numbers in my own hands has proved to be of considerable utility.

From the description which I have given of the process by which I have computed the wave-lengths from KIRCHHOFF'S measures, it will be perceived that the results are not rigorously accurate, unless the same system (whatever it may be) has been rigorously followed by KIRCHHOFF through the whole of his measures. Now KIRCHHOFF has distinctly stated that he did not in every case adapt his prisms carefully to the angle of minimum deviation. So far as I could learn by communication (through Professor ROSCOE) with M. KIRCHHOFF, no memorandum was preserved on the possible amount of the error thus introduced. I was confident, however, as well from the character of Professor KIRCHHOFF as from the absence of any apparent *saltus* in the measures, that the error must be small, perhaps imperceptible. It was a matter of great satisfaction to me therefore, after the completion of my work, to be referred to two late series of direct measures of wave-length for numerous lines. One is that by ÅNGSTRÖM, published in POGGENDORFF'S 'Annalen der Physik und Chemie,' CXXIII. Band, p. 498, in which I have found 51 lines apparently identifiable with lines measured by KIRCHHOFF. The measures in these series are expressed by the Paris inch; and the possession of my own calculations in terms of the Paris inch, to which I have alluded above, greatly facilitated the comparison of ÅNGSTRÖM'S measures with my calculations. The other is that by DITSCHNEINER, published in the 'Sitzungsberichte der Mathematisch-Naturwissenschaftlichen Classe der Kaiserlichen (Wiener) Academie der Wissenschaften,' L. Band, II. Abtheilung, 1864, page 340: it contains direct measures of the wave-length, expressed in millimetres, for 107 of the lines measured by KIRCHHOFF. The comparison of these direct measures with my computed values of the wave-length exhibited small discrepancies, of which the greater part arises from discordances between the values for the fundamental lines found by FRAUNHOFER and those determined by ÅNGSTRÖM and DITSCHNEINER (which those philosophers ascribe to an erroneous evaluation by FRAUNHOFER of his interference-grating); a part apparently is produced by faults inherent in every process of interpolation among a limited number of values, especially when that interpolation is so extended as to become extrapolation; but, as I believe, no sensible part, or a very small part, can arise from the suspected class of errors in the measures of the prismatic dispersion-spectrum.

I had arrived at this stage of my work, when I became acquainted with DITSCHNEINER'S Essay contained in the 'Sitzungsberichte der Mathematisch-Naturwissenschaftlichen

Classe der Kaiserlichen Akademie der Wissenschaften,' LII. Band, II. Abtheilung, page 289, &c. This paper gives the details of a new measure of the grating with which FRAUNHOFER'S original measures of wave-lengths were made (as I understand M. DITSCHNEINER'S words); and by means of this correction of measure, and the corresponding correction of wave-length for the line D common to FRAUNHOFER'S and DITSCHNEINER'S measures, DITSCHNEINER computed new values of wave-lengths for the entire series of lines, primary and secondary, which he had himself observed. On careful consideration of all the circumstances of formation of these new values, it appeared to me that it was indispensable for me to base my reduction of KIRCHHOFF'S measures upon DITSCHNEINER'S new values. I should thus have the opportunity of introducing a value for B, which would enable me to adopt a function of the 5th order instead of the 4th order (upon which all my preceding calculations were founded); and I could use the same opportunity for making correction for a petty error which I had committed in the line E (I had inadvertently used 1527.7 instead of 1523.2 for KIRCHHOFF'S measure).

My immediate object, in calculation, now was, to make such an addition to the function embodied in my former calculations as would produce definite alterations in the wave-lengths computed for B, C, D, E, F, G. This, it was evident, could be done by a function or a sum of functions of the 5th order; and I had only to adopt the most convenient form. Remarking that KIRCHHOFF'S measures for B, C, D, E, F (with the decimal point thrown back three places) differ very little from 0.6, 0.7, 1.0, 1.5, 2.1, and that the measure for G is not very different from 2.9, I adopted the following form for general correction; where by [0.6], [0.7], [1.0], [1.5], [2.1], [2.9], are meant certain constants whose values will shortly be seen.

General correction for all values of  $k$ .

$$\begin{aligned}
 & \frac{\text{correction for } k=0.6}{[0.6]} \times (k-0.7) \times (k-1.0) \times (k-1.5) \times (k-2.1) \times (k-2.9) \\
 & + \frac{\text{correction for } k=0.7}{[0.7]} \times (k-0.6) \times (k-1.0) \times (k-1.5) \times (k-2.1) \times (k-2.9) \\
 & + \frac{\text{correction for } k=1.0}{[1.0]} \times (k-0.6) \times (k-0.7) \times (k-1.5) \times (k-2.1) \times (k-2.9) \\
 & + \frac{\text{correction for } k=1.5}{[1.5]} \times (k-0.6) \times (k-0.7) \times (k-1.0) \times (k-2.1) \times (k-2.9) \\
 & + \frac{\text{correction for } k=2.1}{[2.1]} \times (k-0.6) \times (k-0.7) \times (k-1.0) \times (k-1.5) \times (k-2.9) \\
 & + \frac{\text{correction for } k=2.9}{[2.9]} \times (k-0.6) \times (k-0.7) \times (k-1.0) \times (k-1.5) \times (k-2.1).
 \end{aligned}$$

The numerical values of the products following the fraction in each line are given, for every 0.1 of  $k$  from 0.0 to 3.0, in the last six columns of the following Table.

Corrections to the computed Wave-lengths, on different suppositions as to the parts of the series which are to be left without alteration.

| Approximate places of principal lines. | Values of $k$ . | No correction for $k=0.7$ , 1.0, 1.5, 2.1, 2.9;<br>Correction for $k=0.6$ being +124.2. | No correction for $k=0.6$ , 1.0, 1.5, 2.1, 2.9;<br>Correction for $k=0.7$ being +73.9. | No correction for $k=0.6$ , 0.7, 1.5, 2.1, 2.9;<br>Correction for $k=1.0$ being +125.4. | No correction for $k=0.6$ , 0.7, 1.0, 2.1, 2.9;<br>Correction for $k=1.5$ being +302.4. | No correction for $k=0.6$ , 0.7, 1.0, 1.5, 2.9;<br>Correction for $k=2.1$ being +110.9. | No correction for $k=0.6$ , 0.7, 1.0, 1.5, 2.1;<br>Correction for $k=2.9$ being +107.7. |
|----------------------------------------|-----------------|-----------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| A                                      | 0.0             | +6395                                                                                   | -5481                                                                                  | +3837                                                                                   | -2558                                                                                   | +1827                                                                                   | -132                                                                                    |
|                                        | 0.1             | +4234                                                                                   | -3528                                                                                  | +2352                                                                                   | -1512                                                                                   | +1058                                                                                   | -76                                                                                     |
|                                        | 0.2             | +2668                                                                                   | -2134                                                                                  | +1334                                                                                   | -821                                                                                    | +562                                                                                    | -40                                                                                     |
|                                        | 0.3             | +1572                                                                                   | -1179                                                                                  | +674                                                                                    | -393                                                                                    | +262                                                                                    | -18                                                                                     |
|                                        | 0.4             | +842                                                                                    | -561                                                                                   | +281                                                                                    | -153                                                                                    | +99                                                                                     | -7                                                                                      |
|                                        | 0.5             | +384                                                                                    | -192                                                                                   | +115                                                                                    | -58                                                                                     | +36                                                                                     | -2                                                                                      |
|                                        | 0.6             | +124                                                                                    | 0                                                                                      | 0                                                                                       | 0                                                                                       | 0                                                                                       | 0                                                                                       |
|                                        | 0.7             | 0                                                                                       | +74                                                                                    | 0                                                                                       | 0                                                                                       | 0                                                                                       | 0                                                                                       |
|                                        | 0.8             | -38                                                                                     | +76                                                                                    | +38                                                                                     | -11                                                                                     | +6                                                                                      | -0                                                                                      |
|                                        | 0.9             | -29                                                                                     | +43                                                                                    | +86                                                                                     | -14                                                                                     | +7                                                                                      | -0                                                                                      |
| D                                      | 1.0             | 0                                                                                       | 0                                                                                      | +125                                                                                    | 0                                                                                       | 0                                                                                       | 0                                                                                       |
|                                        | 1.1             | +29                                                                                     | -36                                                                                    | +144                                                                                    | +36                                                                                     | -14                                                                                     | +1                                                                                      |
|                                        | 1.2             | +46                                                                                     | -55                                                                                    | +138                                                                                    | +92                                                                                     | -31                                                                                     | +2                                                                                      |
|                                        | 1.3             | +46                                                                                     | -54                                                                                    | +108                                                                                    | +161                                                                                    | -40                                                                                     | +2                                                                                      |
|                                        | 1.4             | +29                                                                                     | -34                                                                                    | +59                                                                                     | +235                                                                                    | -34                                                                                     | +2                                                                                      |
| E                                      | 1.5             | 0                                                                                       | 0                                                                                      | 0                                                                                       | +302                                                                                    | 0                                                                                       | 0                                                                                       |
|                                        | 1.6             | -35                                                                                     | +39                                                                                    | -59                                                                                     | +351                                                                                    | +70                                                                                     | -3                                                                                      |
|                                        | 1.7             | -67                                                                                     | +74                                                                                    | -106                                                                                    | +370                                                                                    | +184                                                                                    | -6                                                                                      |
|                                        | 1.8             | -87                                                                                     | +95                                                                                    | -131                                                                                    | +348                                                                                    | +348                                                                                    | -10                                                                                     |
|                                        | 1.9             | -86                                                                                     | +93                                                                                    | -125                                                                                    | +281                                                                                    | +562                                                                                    | -11                                                                                     |
| F                                      | 2.0             | -59                                                                                     | +63                                                                                    | -82                                                                                     | +164                                                                                    | +819                                                                                    | -9                                                                                      |
|                                        | 2.1             | 0                                                                                       | 0                                                                                      | 0                                                                                       | 0                                                                                       | +1109                                                                                   | 0                                                                                       |
|                                        | 2.2             | +88                                                                                     | -94                                                                                    | +118                                                                                    | -202                                                                                    | +1411                                                                                   | +20                                                                                     |
|                                        | 2.3             | +200                                                                                    | -212                                                                                   | +261                                                                                    | -424                                                                                    | +1697                                                                                   | +57                                                                                     |
|                                        | 2.4             | +321                                                                                    | -340                                                                                   | +413                                                                                    | -643                                                                                    | +1928                                                                                   | +116                                                                                    |
| G                                      | 2.5             | +432                                                                                    | -456                                                                                   | +547                                                                                    | -821                                                                                    | +2052                                                                                   | +205                                                                                    |
|                                        | 2.6             | +502                                                                                    | -528                                                                                   | +627                                                                                    | -912                                                                                    | +2006                                                                                   | +334                                                                                    |
|                                        | 2.7             | +490                                                                                    | -514                                                                                   | +605                                                                                    | -857                                                                                    | +1714                                                                                   | +514                                                                                    |
|                                        | 2.8             | +344                                                                                    | -360                                                                                   | +420                                                                                    | -582                                                                                    | +1081                                                                                   | +757                                                                                    |
|                                        | 2.9             | 0                                                                                       | 0                                                                                      | 0                                                                                       | 0                                                                                       | 0                                                                                       | +1077                                                                                   |
|                                        | 3.0             | -621                                                                                    | +648                                                                                   | -745                                                                                    | +994                                                                                    | -1656                                                                                   | +1490                                                                                   |

It is easily seen now that [0.6] is the number corresponding to  $k=0.6$  in the third column of the Table; that [0.7] is the number corresponding to  $k=0.7$  in the fourth column of the Table; and so for the others.

It appeared now that the corrections to be applied to numbers which I had actually computed, in order to produce DITSCHNER's numbers, were the following:—

|                  |       |
|------------------|-------|
| For line B . . . | +320  |
| C . . .          | +147  |
| D . . .          | +142  |
| E . . .          | + 97  |
| F . . .          | +123  |
| G . . .          | +213. |

And, after making a preliminary calculation, the following corrections were found to be necessary:—

$$\begin{aligned}
 \text{For } k=0.6, \quad & +306 = +140 + 124 \times (1 + \frac{1}{3}) \\
 0.7, \quad & +142 = +140 + 74 \times \frac{1}{50} \\
 1.0, \quad & +140 = +140 \\
 1.5, \quad & +109 = +140 - 302 \times \frac{1}{10} \\
 2.1, \quad & +149 = +140 + 1109 \times \frac{1}{120} \\
 2.9, \quad & - 98 = +140 - 1077 \times (\frac{1}{5} + \frac{1}{50}).
 \end{aligned}$$

The factors in the last column are [0.6], [0.7], &c. respectively.

Then, using the number +140 as a general correction, and using the numbers of the last column for “Correction for  $k=0.6$ ,” “Correction for  $k=0.7$ ,” &c. in the general formula (or, in other words, multiplying the 3rd, 4th, &c. columns of the Table, by  $(1 + \frac{1}{3})$ ,  $\frac{1}{50}$ , &c.), the following special numerical corrections are obtained.

Corrections to the wave-lengths as originally computed. (The unit of the corrections is the same as the unit of the last figure of the computed wave-lengths in millimetres.)

| $k$ . | Correction. | $k$ . | Correction. | $k$ . | Correction. |
|-------|-------------|-------|-------------|-------|-------------|
| 0.0   | +8857       | 1.0   | +140        | 2.0   | + 55        |
| 0.1   | +5891       | 1.1   | +174        | 2.1   | + 149       |
| 0.2   | +3750       | 1.2   | +191        | 2.2   | + 283       |
| 0.3   | +2257       | 1.3   | +184        | 2.3   | + 447       |
| 0.4   | +1269       | 1.4   | +154        | 2.4   | + 616       |
| 0.5   | + 654       | 1.5   | +110        | 2.5   | + 761       |
| 0.6   | + 305       | 1.6   | + 61        | 2.6   | + 832       |
| 0.7   | + 141       | 1.7   | + 18        | 2.7   | + 770       |
| 0.8   | + 92        | 1.8   | — 4         | 2.8   | + 493       |
| 0.9   | + 103       | 1.9   | + 6         | 2.9   | — 97        |
|       |             |       |             | 3.0   | —1116       |

With these numbers, a curve was laid down, and the corrections for every 0.01 of  $k$  were obtained graphically. Between these, the corrections for all the individual lines were interpolated numerically, and were applied separately to each computed wave-length. Every number which is presented in the following Tables is affected with the correction.

The agreement of the computed numbers with DITSCHNEINER's, or with ÅNGSTRÖM's (after multiplication by the proper factor), as far as they admit of comparison, is not so close as I expected. For the lines B, C, D, E, F, G, the accordance with DITSCHNEINER's

numbers is necessarily (from the nature of the process) almost perfect. But between each of these principal lines and the next, the discordance rises gradually from 0 to a considerable value and then drops gradually to 0. Between F and G the value is large. The discordances, however, are systematic. There is no appearance of any *saltus* between one principal line and the next; but there is nothing to enable us to decide positively whether there is a *saltus* at each principal line.

It appears to me that we must look to one of the three following causes for explanation:—

1. The actual inability of a formula of the fifth order to represent the wave-length in terms of the spectrum-measure with sufficient approximation.
2. A change in Professor KIRCHHOFF'S method of observation at each successive principal line.
3. A change in DITSCHNEINER'S and ÅNGSTRÖM'S methods at each successive principal line.

The third of these suggestions is extremely improbable: and after remarking the harmonious flow in the course of the discordances in every interval between principal lines (a harmony which gives no small testimony to the care employed in both classes of measures, and to the accuracy of the interpolation-details in the computation which connects them), I am hardly inclined to advocate the second suggestion. I think it more probable that the real cause is to be found in the first.

I remark, however, that this doubt affects only the physical question on the broad scale. It does not affect the possibility of computing with accuracy the wave-length for any one of KIRCHHOFF'S lines. By means of the comparison between the computed wave-lengths and DITSCHNEINER'S measures (at the end of the Tables) there is no difficulty in computing for any other line the correction that ought to be applied to the wave-length in the principal Tables, in order to exhibit the true wave-lengths on DITSCHNEINER'S scale, without appreciable error.

I have now only to explain the Tables which follow.

The principal Table, headed "Conversion of KIRCHHOFF'S Spectral Measures into Wave-lengths in terms of the Millimetre," corresponds, in extent, to KIRCHHOFF'S Tables in the Berlin Memoirs, 1861 and 1862. Instead, however, of adopting the broken arrangement of these Memoirs, I have placed the numbers in a continuous series, and I have omitted the repetitions in KIRCHHOFF'S successive Tables.

The Table consists throughout of four columns (one of which is occasionally blank). The first column contains simply KIRCHHOFF'S measures; and the second contains the corresponding wave-lengths, computed by the process described above. The third column contains KIRCHHOFF'S symbols expressing the darkness and the breadth of the lines; 1 expresses a slight darkness, 2 a little darker, and so on up to 6 which is very dark; *a* denotes a very narrow line, *b* a little broader, and so on up to *g*, which is a line of considerable breadth (the measure of the breadth is not given). The fourth column (where it is used) contains the contracted name of the metal which, by combustion, pro-

duces a line corresponding in spectral position to the line here measured. This Table is, in fact, KIRCHHOFF'S Table, with the insertion throughout of one column containing the computed values of the wave-lengths. In copying the first column, I have endeavoured to copy the braces and brackets of KIRCHHOFF'S Table, without in every case understanding their application.

The Table which next follows is KIRCHHOFF'S special Table for the lines produced by the metals Cerium, Didymium, Lanthanum, Palladium, Platinum, Ruthenium, Iridium, with the corresponding wave-lengths. Two of its compartments contain the lines in a combination of Lanthanum and Didymium, and in a combination of Ruthenium and Iridium. It is accompanied by a similar Table of lines produced by the atmosphere.

The next Table (formed by myself) contains the wave-lengths for each of the metals whose lines have been measured by KIRCHHOFF, and are contained either in the General Table of lines of the solar spectrum, or in the smaller special Table which I have just described. The numbers are simply extracted from those Tables. I may mention that my original intention was to confine my computations to these metal-lines, in the hope that they might give some assistance to the formation of a mechanical theory.

The two last Tables contain the comparison of direct measures of the wave-length made by ÅNGSTRÖM and DITSCHNEINER with the computed measures given in the General Table, as far as the identity of the lines appears to be established. ÅNGSTRÖM'S measures were given in terms of the Paris inch: I have preserved these; and have also given their equivalents in terms of the millimetre.

I have only to add that, in my original communication to the Royal Society, dated 1867, March 2, the modifications of the first computed numbers, now introduced after consideration of DITSCHNEINER'S later measures, had not been applied. I have now incorporated them in the finished Tables, with the permission of the President and Council of the Society.

G. B. AIRY.

*Royal Observatory, Greenwich,  
1867, October 15.*

Conversion of KIRCHHOFF'S Spectral Measures into Wave-Lengths, in terms of the Milli-  
metre.

| Kirchhoff's measure. | Wave-length,<br>m.m.<br>0.000 |            |  | Kirchhoff's measure. | Wave-length,<br>m.m.<br>0.000. |            |  |
|----------------------|-------------------------------|------------|--|----------------------|--------------------------------|------------|--|
| 381.7                | 77694                         | 1 <i>c</i> |  | 476.4                | 73266                          | 1 <i>b</i> |  |
| 384.1                | 77574                         | 2 <i>c</i> |  | (477.0               | 73240                          | 2          |  |
| 385.9                | 77479                         | 2 <i>d</i> |  |                      |                                | 5 <i>b</i> |  |
| 387.5                | 77396                         | 3 <i>d</i> |  | 477.8                | 73206                          | 2          |  |
| 388.9                | 77322                         | 4 <i>d</i> |  | (479.1               | 73153                          | 4 <i>b</i> |  |
| 390.4                | 77249                         | 4 <i>e</i> |  |                      |                                | 2 <i>c</i> |  |
| 392.1                | 77160                         | 5 <i>e</i> |  | 480.1                | 73113                          | 1          |  |
| 393.6                | 77085                         | 6 <i>e</i> |  | (480.4               | 73100                          | 6 <i>c</i> |  |
| 395.0                | 77012                         | 6 <i>e</i> |  | 481.2                | 73067                          | 4 <i>d</i> |  |
| 396.2                | 76950                         | 5 <i>e</i> |  | 482.1                | 73031                          | 4 <i>c</i> |  |
| 397.4                | 76890                         | 4 <i>e</i> |  | 483.3                | 72979                          | 2 <i>d</i> |  |
| 398.4                | 76838                         | 4 <i>d</i> |  | 484.1                | 72949                          | 4 <i>d</i> |  |
| 399.2                | 76799                         | 4 <i>d</i> |  | 485.1                | 72906                          | 2 <i>d</i> |  |
| 399.8                | 76767                         | 4 <i>d</i> |  | 486.2                | 72861                          | 3 <i>d</i> |  |
| 400.4                | 76743                         | 3 <i>d</i> |  | 486.8                | 72836                          | 6 <i>e</i> |  |
| (401.9               | 76670                         | 4 <i>c</i> |  | from (488.2          | 72778                          | 2 <i>c</i> |  |
|                      |                               | 3          |  | 488.8                | 72754                          | 1          |  |
| 402.4                | 76648                         | 4          |  | 489.6                | 72719                          | 5 <i>a</i> |  |
| 402.8                | 76625                         | 5          |  | (491.2               | 72652                          | 6 <i>c</i> |  |
| 403.2                | 76605                         | 6          |  | 491.5                | 72641                          | 3 <i>e</i> |  |
| 405.0                | 76517                         | 5          |  | 491.9                | 72621                          | 5 <i>b</i> |  |
| 405.6                | 76492                         | 4          |  | 493.1                | 72575                          | 4 <i>c</i> |  |
| (406.2               | 76462                         | 3          |  | 494.1                | 72531                          | 2 <i>c</i> |  |
|                      |                               | 5 <i>e</i> |  | (495.4               | 72478                          | 3 <i>b</i> |  |
| 406.8                | 76436                         | 1 <i>d</i> |  | 495.7                | 72466                          | 1 <i>e</i> |  |
| 408.5                | 76336                         | 2 <i>b</i> |  | 497.2                | 72400                          | 2 <i>b</i> |  |
| 423.7                | 75641                         | 2 <i>b</i> |  | 497.5                | 72388                          | 1 <i>b</i> |  |
| 426.6                | 75477                         | 2 <i>c</i> |  | 497.8                | 72388                          | 2 <i>a</i> |  |
| 433.8                | 75147                         | 2 <i>b</i> |  | 498.4                | 72351                          | 4 <i>c</i> |  |
| 437.0                | 75003                         | 2 <i>c</i> |  | 499.0                | 72324                          | 5 <i>b</i> |  |
| 442.8                | 74746                         | 2 <i>d</i> |  | 499.9                | 72287                          | 5 <i>d</i> |  |
| 444.6                | 74663                         | 2 <i>c</i> |  | 500.8                | 72253                          | 3 <i>d</i> |  |
| 445.8                | 74611                         | 2 <i>b</i> |  | (501.8               | 72214                          | 2 <i>c</i> |  |
| 446.1                | 74599                         | 2 <i>b</i> |  | 502.0                | 72207                          | 5 <i>b</i> |  |
| 447.0                | 74560                         | 2 <i>a</i> |  | 502.6                | 72183                          | 5 <i>c</i> |  |
| 448.4                | 74496                         | 1 <i>b</i> |  | 503.8                | 72132                          | 6 <i>d</i> |  |
| 452.6                | 74308                         | 2 <i>c</i> |  | 504.3                | 72113                          | 5 <i>b</i> |  |
| 453.0                | 74292                         | 1 <i>b</i> |  | 505.1                | 72082                          | 6 <i>c</i> |  |
| 454.4                | 74231                         | 1 <i>b</i> |  | (506.2               | 72036                          | 2 <i>b</i> |  |
| 460.0                | 73981                         | 1 <i>c</i> |  | 506.4                | 72029                          | 5 <i>b</i> |  |
| 461.0                | 73937                         | 1 <i>b</i> |  | (506.6               | 72020                          | 2 <i>b</i> |  |
| 462.2                | 73884                         | 2 <i>b</i> |  | 507.4                | 71990                          | 5 <i>c</i> |  |
| 463.3                | 73837                         | 2 <i>a</i> |  | 508.2                | 71956                          | 3 <i>b</i> |  |
| 466.0                | 73720                         | 1 <i>b</i> |  | 509.1                | 71918                          | 3 <i>b</i> |  |
| 466.5                | 73698                         | 2 <i>c</i> |  | 509.9                | 71885                          | 2 <i>b</i> |  |
| 467.0                | 73676                         | 1 <i>b</i> |  | 510.9                | 71846                          | 1 <i>a</i> |  |
| 468.1                | 73627                         | 2 <i>e</i> |  | 512.9                | 71767                          | 2 <i>b</i> |  |
| 470.0                | 73542                         | 2 <i>b</i> |  | 513.6                | 71741                          | 3 <i>b</i> |  |
| 470.5                | 73520                         | 3 <i>c</i> |  | 517.1                | 71606                          | 2 <i>b</i> |  |
| 470.9                | 73504                         | 2 <i>b</i> |  | 519.3                | 71513                          | 2 <i>b</i> |  |
| (472.4               | 73437                         | 2 <i>e</i> |  | 521.6                | 71426                          | 1 <i>b</i> |  |
| 472.7                | 73425                         | 3 <i>c</i> |  | 529.4                | 71129                          | 1 <i>b</i> |  |
| (473.8               | 73379                         | 4 <i>d</i> |  | 530.4                | 71089                          | 1 <i>c</i> |  |
|                      |                               | 1          |  | 532.8                | 70997                          | 1 <i>b</i> |  |
| 474.7                | 73341                         | 3 <i>b</i> |  | 536.9                | 70840                          | 2 <i>b</i> |  |
| from 475.7           | 73297                         | 2          |  | 537.3                | 70826                          | 1 <i>b</i> |  |

TABLE (continued).

| Kirchhoff's measure. | Wave-length,<br>m.m.<br>0.000. |            |  | Kirchhoff's measure. | Wave-length,<br>m.m.<br>0.000 |            |            |     |
|----------------------|--------------------------------|------------|--|----------------------|-------------------------------|------------|------------|-----|
| 540.6                | 70705                          | 3 <i>b</i> |  | 597.4                | 68681                         | 1 <i>b</i> |            |     |
| 541.1                | 70685                          | 2 <i>c</i> |  | 601.2                | 68556                         | 1 <i>a</i> |            |     |
| 542.0                | 70649                          | 1 <i>a</i> |  | 601.8                | 68535                         | 1 <i>b</i> |            |     |
| 543.6                | 70591                          | 4 <i>b</i> |  | 602.8                | 68501                         | 1 <i>a</i> |            |     |
| 544.6                | 70554                          | 3 <i>d</i> |  | 606.0                | 68396                         | 1 <i>b</i> |            |     |
| 547.0                | 70464                          | 4 <i>c</i> |  | 608.3                | 68317                         | 1 <i>a</i> |            |     |
| 547.9                | 70430                          | 2 <i>b</i> |  | 612.4                | 68186                         | 1 <i>b</i> |            |     |
| 549.6                | 70366                          | 3 <i>e</i> |  | 613.4                | 68151                         | 1 <i>a</i> |            |     |
| 551.2                | 70310                          | 3 <i>c</i> |  | 623.4                | 67831                         | 1 <i>b</i> |            |     |
| 552.5                | 70263                          | 3 <i>c</i> |  | 626.1                | 67744                         | 1 <i>b</i> |            |     |
| (553.8               | 70213                          | 1 <i>c</i> |  | 631.4                | 67576                         | 1 <i>b</i> |            |     |
| 554.0                | 70207                          | 3 <i>b</i> |  | 638.4                | 67357                         | 1 <i>b</i> |            |     |
| 554.6                | 70183                          | 2 <i>b</i> |  | 639.8                | 67310                         | 1 <i>b</i> |            |     |
| 557.0                | 70100                          | 1 <i>a</i> |  | 641.0                | 67273                         | 2 <i>b</i> | Ca         |     |
| 557.7                | 70073                          | 2 <i>b</i> |  | 645.3                | 67140                         | 1 <i>b</i> |            |     |
| 558.1                | 70058                          | 1 <i>b</i> |  | 648.1                | 67053                         | 1 <i>b</i> |            |     |
| 559.7                | 69999                          | 1 <i>c</i> |  | 654.3                | 66865                         | 2 <i>b</i> |            |     |
| 561.5                | 69937                          | 1 <i>b</i> |  | 659.3                | 66713                         | 2 <i>a</i> |            |     |
| 562.5                | 69902                          | 3 <i>b</i> |  | 665.7                | 66524                         | 2 <i>a</i> |            |     |
| 563.0                | 69883                          | 2 <i>c</i> |  | 669.5                | 66410                         | 2 <i>b</i> |            |     |
| 564.1                | 69845                          | 4 <i>c</i> |  | 678.6                | 66150                         | 1 <i>b</i> |            |     |
| 565.0                | 69809                          | 2 <i>c</i> |  | 681.4                | 66068                         | 1 <i>a</i> |            |     |
| 566.0                | 69773                          | 2 <i>c</i> |  | 682.8                | 66028                         | 1 <i>b</i> |            |     |
| 566.9                | 69741                          | 2 <i>b</i> |  | 683.1                | 66020                         | 2 <i>a</i> |            |     |
| 567.4                | 69722                          | 3 <i>b</i> |  | 685.3                | 65956                         | 1 <i>b</i> |            |     |
| 568.6                | 69680                          | 2 <i>b</i> |  | 689.8                | 65829                         | 2 <i>b</i> |            |     |
| { 569.2              | 69660                          | 1          |  | 690.9                | 65798                         | 1 <i>a</i> |            |     |
|                      |                                | 2 <i>b</i> |  | 692.1                | 65765                         | 2 <i>a</i> |            |     |
|                      |                                | 1          |  | C { from<br>to       | 693.4                         | 65729      | 1          | Air |
| 570.0                | 69629                          | 3 <i>c</i> |  |                      | 694.1                         | 65710      | 6 <i>e</i> |     |
| 570.6                | 69608                          | 2 <i>b</i> |  |                      | 694.8                         | 65690      | 1          |     |
| 572.2                | 69552                          | 3 <i>b</i> |  |                      | 698.1                         | 65598      | 2 <i>a</i> |     |
| 572.9                | 69526                          | 1 <i>b</i> |  | 700.0                | 65545                         | 2 <i>a</i> |            |     |
| 573.6                | 69502                          | 3 <i>c</i> |  | 701.1                | 65514                         | 2 <i>b</i> |            |     |
| 574.4                | 69473                          | 1 <i>b</i> |  | 702.1                | 65486                         | 2 <i>a</i> |            |     |
| 575.1                | 69449                          | 2 <i>d</i> |  | 702.6                | 65472                         | 1 <i>b</i> |            |     |
| 576.6                | 69398                          | 2 <i>d</i> |  | 705.5                | 65395                         | 2 <i>a</i> |            |     |
| 578.1                | 69346                          | 3 <i>d</i> |  | 705.9                | 65383                         | 2 <i>a</i> |            |     |
| 579.6                | 69290                          | 3 <i>d</i> |  | 707.5                | 65339                         | 1 <i>b</i> |            |     |
| 581.1                | 69238                          | 3 <i>e</i> |  | 708.6                | 65311                         | 2 <i>b</i> |            |     |
| 582.5                | 69192                          | 3 <i>e</i> |  | 710.5                | 65258                         | 2 <i>e</i> |            |     |
| 583.8                | 69137                          | 4 <i>e</i> |  | 711.4                | 65233                         | 3 <i>c</i> |            |     |
| 585.0                | 69106                          | 4 <i>f</i> |  | 712.0                | 65218                         | 2 <i>b</i> |            |     |
| 586.2                | 69065                          | 4 <i>e</i> |  | 713.2                | 65185                         | 1 <i>b</i> |            |     |
| 587.0                | 69035                          | 3 <i>e</i> |  | 714.4                | 65151                         | 1 <i>c</i> |            |     |
| 587.9                | 69005                          | 2 <i>b</i> |  | 717.8                | 65059                         | 2 <i>b</i> | Ca         |     |
| 589.0                | 68970                          | 3 <i>b</i> |  | from 718.7           | 65035                         | 2          | Ba         |     |
| 589.4                | 68955                          | 3 <i>b</i> |  | (719.6               | 65011                         | 3 <i>a</i> |            |     |
| 589.9                | 68938                          | 3 <i>b</i> |  | 720.1                | 65000                         | 2 <i>e</i> | Ca         |     |
| 590.3                | 68925                          | 3 <i>b</i> |  | 721.1                | 64972                         | 2 <i>b</i> | Fe         |     |
| 590.7                | 68911                          | 3 <i>b</i> |  | 723.7                | 64903                         | 2 <i>c</i> |            |     |
| 591.1                | 68896                          | 3 <i>b</i> |  | 724.2                | 64890                         | 1 <i>b</i> |            |     |
| 591.5                | 68882                          | 4 <i>b</i> |  | 725.1                | 64867                         | 1 <i>b</i> | Air        |     |
| 591.9                | 68869                          | 4 <i>b</i> |  | 726.7                | 64825                         | 3 <i>c</i> |            |     |
| 592.3                | 68856                          | 3 <i>b</i> |  | 727.8                | 64796                         | 1 <i>c</i> |            |     |
| B(592.7              | 68853                          | 6 <i>c</i> |  | 728.0                | 64791                         | 2 <i>a</i> |            |     |
| 593.1                | 68829                          | 4 <i>g</i> |  | 729.0                | 64764                         | 2 <i>b</i> | Ca         |     |
| 595.0                | 68764                          | 1 <i>a</i> |  | 731.7                | 64695                         | 5 <i>b</i> | Ca         |     |
| 596.6                | 68707                          | 1 <i>a</i> |  | 734.0                | 64634                         | 1 <i>d</i> |            |     |

TABLE (continued).

| Kirchhoff's measure. | Wave-length,<br>m.m.<br>0.000 |            |          | Kirchhoff's measure. | Wave-length,<br>m.m.<br>0.000. |            |        |
|----------------------|-------------------------------|------------|----------|----------------------|--------------------------------|------------|--------|
| 736.9                | 64559                         | 3 <i>b</i> | Ca       | 838.2                | 62158                          | 1 <i>b</i> |        |
| 740.9                | 64456                         | 5 <i>b</i> | Ca, Cd   | 838.6                | 62150                          | 2 <i>b</i> |        |
| 743.7                | 64384                         | 2 <i>b</i> |          | 839.2                | 62136                          | 2 <i>b</i> |        |
| 744.3                | 64368                         | 4 <i>b</i> |          | 845.7                | 62001                          | 2 <i>b</i> |        |
| 748.1                | 64271                         | 4 <i>b</i> |          | 849.7                | 61915                          | 3 <i>c</i> | Fe     |
| 748.7                | 64257                         | 3 <i>b</i> |          | 851.2                | 61881                          | 1 <i>a</i> |        |
| 750.1                | 64220                         | 1 <i>a</i> |          | 851.8                | 61868                          | 1 <i>a</i> |        |
| 751.0                | 64199                         | 1 <i>b</i> |          | 855.0                | 61802                          | 2 <i>a</i> |        |
| 752.3                | 64165                         | 4 <i>b</i> |          | 856.8                | 61764                          | 2 <i>a</i> |        |
| 753.8                | 64129                         | 3 <i>b</i> | Sr       | 857.5                | 61749                          | 2 <i>a</i> |        |
| 756.9                | 64049                         | 5 <i>b</i> | Fe       | 858.3                | 61734                          | 2 <i>a</i> |        |
| 759.3                | 63989                         | 3 <i>b</i> |          | 859.7                | 61704                          | 3 <i>a</i> |        |
| 764.2                | 63869                         | 1 <i>a</i> |          | 860.2                | 61693                          | 3 <i>d</i> | Ca     |
| 771.8                | 63683                         | 1 <i>a</i> | Zn       | 861.6                | 61662                          | 2 <i>a</i> |        |
| 773.4                | 63644                         | 2 <i>b</i> |          | 862.2                | 61649                          | 1 <i>a</i> |        |
| 774.8                | 63611                         | 2 <i>b</i> |          | 863.2                | 61631                          | 2 <i>c</i> |        |
| 778.3                | 63525                         | 1 <i>b</i> | (Ru, Ir) | 863.9                | 61617                          | 5 <i>b</i> | Ca     |
| 779.5                | 63498                         | 1 <i>b</i> |          | 864.4                | 61606                          | 1 <i>d</i> |        |
| 781.9                | 63438                         | 3 <i>b</i> |          | 866.2                | 61568                          | 2 <i>b</i> |        |
| 783.1                | 63411                         | 4 <i>b</i> |          | 867.1                | 61549                          | 2 <i>b</i> |        |
| 783.8                | 63395                         | 3 <i>b</i> |          | 867.6                | 61539                          | 1 <i>a</i> |        |
| 786.8                | 63323                         | 1 <i>a</i> |          | 869.2                | 61507                          | 2 <i>b</i> |        |
| 788.9                | 63273                         | 3 <i>b</i> |          | 870.9                | 61472                          | 1 <i>b</i> |        |
| 791.0                | 63223                         | 1 <i>d</i> |          | 871.4                | 61461                          | 2 <i>b</i> |        |
| 791.4                | 63214                         | 3 <i>b</i> |          | 872.5                | 61439                          | 1 <i>b</i> |        |
| 792.9                | 63180                         | 2 <i>d</i> |          | 874.0                | 61411                          | 1 <i>b</i> |        |
| 794.5                | 63144                         | 1 <i>d</i> |          | 874.3                | 61405                          | 4 <i>b</i> | Ba     |
| 798.1                | 63059                         | 3 <i>a</i> |          | 876.5                | 61358                          | 4 <i>a</i> |        |
| 798.5                | 63049                         | 4 <i>a</i> | Fe       | 877.0                | 61348                          | 4 <i>c</i> | Fe     |
| 799.8                | 63019                         | 2 <i>b</i> |          | 879.8                | 61292                          | 1 <i>b</i> |        |
| 800.3                | 63005                         | 2 <i>b</i> |          | 880.9                | 61271                          | 1 <i>a</i> |        |
| 801.2                | 62987                         | 1 <i>a</i> |          | 881.6                | 61255                          | 2 <i>a</i> |        |
| 801.5                | 62980                         | 1 <i>a</i> |          | 882.6                | 61237                          | 1 <i>a</i> |        |
| 802.7                | 62952                         | 1 <i>b</i> |          | 883.2                | 61223                          | 1 <i>b</i> |        |
| 803.5                | 62935                         | 2 <i>a</i> |          | 884.9                | 61191                          | 4 <i>b</i> | Ca, Co |
| 805.8                | 62881                         | 1 <i>b</i> |          | 887.7                | 61135                          | 2 <i>a</i> | Ni     |
| 807.4                | 62845                         | 2 <i>b</i> |          | 890.2                | 61086                          | 1 <i>b</i> | Ba     |
| 808.2                | 62826                         | 2 <i>c</i> |          | 891.7                | 61056                          | 2 <i>a</i> | Ni     |
| 808.7                | 62815                         | 1 <i>c</i> |          | 894.9                | 60990                          | 2 <i>e</i> | Ca, Li |
| 809.5                | 62796                         | 3 <i>b</i> | Au       | 896.1                | 60968                          | 1 <i>a</i> |        |
| 809.9                | 62785                         | 2 <i>d</i> |          | 896.7                | 60957                          | 1 <i>b</i> |        |
| 812.7                | 62723                         | 1 <i>a</i> |          | 898.9                | 60912                          | 1 <i>a</i> |        |
| 813.1                | 62715                         | 2 <i>a</i> |          | 899.1                | 60909                          | 1 <i>a</i> |        |
| 815.0                | 62672                         | 4 <i>b</i> |          | 900.2                | 60888                          | 1 <i>a</i> |        |
| 816.8                | 62631                         | 2 <i>b</i> |          | 901.4                | 60864                          | 1 <i>a</i> |        |
| 818.0                | 62606                         | 3 <i>c</i> |          | 901.6                | 60860                          | 1 <i>a</i> |        |
| 819.0                | 62582                         | 4 <i>b</i> |          | 902.4                | 60844                          | 1 <i>a</i> |        |
| 820.1                | 62558                         | 4 <i>b</i> |          | 903.1                | 60829                          | 1 <i>a</i> |        |
| 820.9                | 62542                         | 4 <i>b</i> |          | 903.6                | 60821                          | 1 <i>a</i> |        |
| 823.5                | 62482                         | 1 <i>a</i> |          | 904.6                | 60803                          | 1 <i>a</i> |        |
| 824.0                | 62471                         | 4 <i>b</i> |          | 906.1                | 60773                          | 2 <i>c</i> |        |
| 824.9                | 62452                         | 1 <i>d</i> |          | 912.1                | 60659                          | 3 <i>b</i> | Fe     |
| 826.4                | 62420                         | 2 <i>a</i> |          | *916.3               | 60578                          | 2 <i>b</i> |        |
| 827.6                | 62393                         | 1 <i>a</i> |          | 923.0                | 60452                          | 2 <i>b</i> |        |
| 828.0                | 62382                         | 2 <i>a</i> |          | 929.5                | 60330                          | 2 <i>b</i> |        |
| 830.2                | 62333                         | 3 <i>b</i> |          | 931.3                | 60297                          | 4 <i>b</i> | Fe     |
| 831.0                | 62317                         | 4 <i>c</i> | Fe       | 932.5                | 60277                          | 4 <i>b</i> |        |
| 831.7                | 62301                         | 1 <i>b</i> |          | 933.3                | 60262                          | 4 <i>c</i> |        |
| 836.5                | 62196                         | 2 <i>b</i> |          | 935.1                | 60229                          | 4 <i>b</i> |        |

\* A large proportion of the measures, from 916.3 to 1006.8, are included in a subsequent Table of Atmospheric Lines.—G. B. A.

TABLE (continued).

| Kirchhoff's measure. | Wave-length,<br>m.m.<br>0.000 |            |    | Kirchhoff's measure. | Wave-length,<br>m.m.<br>0.000 |            |        |
|----------------------|-------------------------------|------------|----|----------------------|-------------------------------|------------|--------|
| 936.7                | 60199                         | 4 <i>b</i> |    | 1005.0               | 59017                         | 2 <i>b</i> | Ni     |
| 937.4                | 60187                         | 1 <i>b</i> |    | Da 1006.8            | 58988                         | 6 <i>b</i> | Na     |
| 940.1                | 60134                         | 3 <i>b</i> |    | 1011.2               | 58916                         | 3 <i>a</i> |        |
| 940.4                | 60128                         | 2 <i>b</i> |    | 1023.0               | 58726                         | 1 <i>a</i> |        |
| 943.4                | 60075                         | 3 <i>b</i> |    | 1025.5               | 58686                         | 3 <i>a</i> |        |
| 946.6                | 60018                         | 3 <i>b</i> |    | 1027.7               | 58653                         | 2 <i>a</i> |        |
| 947.0                | 60011                         | 1 <i>a</i> |    | 1029.3               | 58626                         | 3 <i>c</i> | Ca, Ni |
| 949.4                | 59967                         | 1 <i>b</i> |    | 1031.8               | 58583                         | 2 <i>a</i> | Ba     |
| 949.8                | 59960                         | 1 <i>b</i> |    | 1032.8               | 58567                         | 1 <i>a</i> |        |
| 951.7                | 59925                         | 1 <i>c</i> |    | 1035.3               | 58528                         | 1 <i>a</i> |        |
| 952.9                | 59904                         | 3 <i>b</i> |    | 1058.0               | 58180                         | 2 <i>b</i> |        |
| 954.3                | 59880                         | 3 <i>b</i> |    | 1063.0               | 58104                         | 2 <i>b</i> |        |
| 954.8                | 59872                         | 3 <i>b</i> |    | 1065.0               | 58072                         | 2 <i>b</i> |        |
| 958.8                | 59801                         | 3 <i>b</i> |    | 1066.0               | 58059                         | 1 <i>a</i> |        |
| 959.6                | 59788                         | 3 <i>b</i> |    | 1067.0               | 58046                         | 2 <i>b</i> |        |
| 961.9                | 59745                         | 1 <i>a</i> |    | 1070.5               | 57990                         | 2 <i>b</i> |        |
| 963.7                | 59713                         | 1 <i>c</i> |    | 1073.5               | 57946                         | 1 <i>a</i> |        |
| 964.4                | 59703                         | 1 <i>c</i> |    | 1074.2               | 57936                         | 1 <i>a</i> |        |
| 968.7                | 59628                         | 2 <i>a</i> |    | 1075.5               | 57916                         | 3 <i>a</i> |        |
| 969.0                | 59623                         | 2 <i>a</i> |    | 1077.5               | 57888                         | 1 <i>a</i> |        |
| 969.6                | 59613                         | 3 <i>a</i> |    | from 1078.9          | 57866                         | } 1        |        |
| 970.5                | 59597                         | 1 <i>b</i> |    | to 1079.7            | 57854                         |            |        |
| 971.5                | 59578                         | 2 <i>c</i> |    | 1080.3               | 57845                         | 1 <i>a</i> |        |
| 972.1                | 59568                         | 1 <i>b</i> |    | 1080.9               | 57836                         | 1 <i>a</i> |        |
| 973.1                | 59551                         | 3 <i>a</i> |    | 1081.8               | 57824                         | 2 <i>b</i> | Cu     |
| 973.5                | 59544                         | 3 <i>a</i> |    | 1083.0               | 57805                         | 2 <i>a</i> | Ba     |
| 974.3                | 59531                         | 2 <i>a</i> |    | 1087.5               | 57738                         | 2 <i>a</i> |        |
| 975.0                | 59519                         | 2 <i>a</i> |    | 1089.6               | 57709                         | 2 <i>a</i> |        |
| 976.8                | 59487                         | 3 <i>a</i> |    | 1096.1               | 57616                         | 3 <i>c</i> | Fe     |
| 977.4                | 59477                         | 2 <i>a</i> |    | 1096.8               | 57607                         | 1 <i>a</i> |        |
| 977.7                | 59471                         | 2 <i>a</i> |    | 1097.8               | 57592                         | 1 <i>a</i> |        |
| 979.1                | 59448                         | 1 <i>b</i> |    | 1100.4               | 57554                         | 1 <i>a</i> |        |
| 980.8                | 59421                         | 1 <i>a</i> |    | 1102.1               | 57527                         | 3 <i>b</i> |        |
| 981.2                | 59415                         | 3 <i>b</i> |    | 1102.9               | 57517                         | 3 <i>a</i> |        |
| 982.0                | 59401                         | 1 <i>a</i> |    | 1103.3               | 57511                         | 2 <i>b</i> |        |
| 982.3                | 59396                         | 2 <i>a</i> |    | 1104.1               | 57498                         | 2 <i>b</i> |        |
| 983.0                | 59384                         | 3 <i>c</i> |    | 1107.1               | 57455                         | 2 <i>c</i> |        |
| 984.5                | 59359                         | 1 <i>c</i> |    | 1111.4               | 57397                         | 1 <i>a</i> |        |
| 986.3                | 59329                         | 1 <i>a</i> |    | 1119.0               | 57289                         | 2 <i>a</i> |        |
| 986.7                | 59323                         | 2 <i>c</i> |    | 1122.6               | 57244                         | 2 <i>a</i> |        |
| 987.4                | 59310                         | 1 <i>b</i> |    | 1128.3               | 57162                         | 2 <i>b</i> |        |
| 988.9                | 59284                         | 2 <i>a</i> |    | 1130.9               | 57126                         | 2 <i>b</i> |        |
| 989.2                | 59279                         | 2 <i>a</i> |    | 1133.1               | 57098                         | 3 <i>c</i> |        |
| 989.6                | 59272                         | 2 <i>a</i> |    | 1133.9               | 57087                         | 3 <i>c</i> |        |
| 990.8                | 59252                         | 2 <i>a</i> |    | 1135.1               | 57068                         | 4 <i>d</i> |        |
| 991.2                | 59246                         | 1 <i>a</i> |    | 1135.9               | 57057                         | 2 <i>c</i> |        |
| 991.9                | 59234                         | 3 <i>b</i> | Fe | 1137.0               | 57043                         | 2 <i>b</i> |        |
| 992.4                | 59225                         | 1 <i>a</i> |    | 1137.8               | 57034                         | 3 <i>b</i> |        |
| 993.9                | 59199                         | 1 <i>b</i> |    | 1141.3               | 56985                         | 2 <i>c</i> |        |
| 994.3                | 59192                         | 1 <i>b</i> |    | 1143.6               | 56956                         | 2 <i>c</i> |        |
| 995.0                | 59180                         | 1 <i>a</i> |    | 1146.2               | 56921                         | 1 <i>b</i> |        |
| 997.2                | 59145                         | 2 <i>b</i> |    | 1147.2               | 56908                         | 1 <i>b</i> |        |
| 998.1                | 59130                         | 1 <i>a</i> |    | 1148.6               | 56890                         | 1 <i>b</i> |        |
| 998.9                | 59117                         | 1 <i>a</i> |    | 1149.4               | 56879                         | 1 <i>b</i> |        |
| 999.2                | 59112                         | 1 <i>a</i> |    | 1151.1               | 56852                         | 4 <i>b</i> |        |
| 1000.0               | 59099                         | 1 <i>a</i> |    | 1152.5               | 56834                         | 2 <i>b</i> |        |
| 1000.4               | 59093                         | 1 <i>a</i> |    | 1154.2               | 56811                         | 3 <i>b</i> |        |
| 1001.4               | 59078                         | 1 <i>a</i> |    | (1155.7              | 56790                         | 3 <i>b</i> |        |
| D <i>b</i> 1002.8    | 59053                         | 6 <i>b</i> | Na | 1155.9               | 56788                         | 2 <i>c</i> |        |

TABLE (continued).

| Kirchhoff's measure. | Wave-length,<br>m.m.<br>0.000 |            |        | Kirchhoff's measure. | Wave-length,<br>m.m.<br>0.000 |            |    |
|----------------------|-------------------------------|------------|--------|----------------------|-------------------------------|------------|----|
| 1158.3               | 56756                         | 2 <i>a</i> |        | 1264.4               | 55439                         | 1 <i>a</i> |    |
| 1160.9               | 56724                         | 2 <i>a</i> |        | 1264.9               | 55434                         | 2 <i>a</i> |    |
| 1165.2               | 56666                         | 1 <i>a</i> |        | 1267.3               | 55406                         | 3 <i>a</i> |    |
| 1165.7               | 56660                         | 1 <i>a</i> |        | 1268.0               | 55398                         | 3 <i>a</i> |    |
| 1167.0               | 56644                         | 1 <i>d</i> |        | 1271.9               | 55352                         | 1 <i>a</i> |    |
| 1168.3               | 56627                         | 1 <i>a</i> |        | 1272.4               | 55347                         | 1 <i>a</i> |    |
| 1169.4               | 56612                         | 1 <i>a</i> |        | 1274.2               | 55326                         | 3 <i>b</i> | Ba |
| 1170.6               | 56596                         | 2 <i>c</i> |        | 1274.7               | 55320                         | 3 <i>a</i> | Sr |
| 1174.2               | 56550                         | 5 <i>d</i> |        | 1276.2               | 55303                         | 2 <i>a</i> |    |
| 1175.0               | 56540                         | 2 <i>a</i> |        | 1276.7               | 55297                         | 1 <i>a</i> |    |
| 1176.6               | 56518                         | 3 <i>c</i> |        | 1280.0               | 55259                         | 6 <i>d</i> |    |
| 1177.0               | 56513                         | 2 <i>a</i> |        | 1281.3               | 55246                         | 3 <i>c</i> |    |
| 1177.3               | 56509                         | 1 <i>a</i> |        | 1282.6               | 55231                         | 2 <i>c</i> |    |
| 1177.6               | 56505                         | 1 <i>a</i> |        | 1285.3               | 55199                         | 2 <i>c</i> |    |
| 1178.6               | 56494                         | 1 <i>a</i> |        | 1287.5               | 55175                         | 1 <i>c</i> | Ba |
| 1179.0               | 56489                         | 1 <i>a</i> |        | 1289.7               | 55149                         | 2 <i>c</i> |    |
| 1179.4               | 56483                         | 1 <i>a</i> |        | 1291.9               | 55125                         | 3 <i>c</i> |    |
| 1179.8               | 56478                         | 1 <i>a</i> |        | 1293.8               | 55105                         | 3 <i>c</i> |    |
| 1180.2               | 56472                         | 1 <i>a</i> |        | 1294.5               | 55097                         | 3 <i>c</i> |    |
| 1183.4               | 56432                         | 2 <i>a</i> |        | 1295.6               | 55083                         | 1 <i>a</i> |    |
| 1184.8               | 56413                         | 3 <i>a</i> |        | 1296.3               | 55075                         | 2 <i>c</i> |    |
| 1186.8               | 56386                         | 2 <i>a</i> |        | 1297.5               | 55061                         | 1 <i>a</i> |    |
| 1187.1               | 56383                         | 2 <i>a</i> |        | 1298.9               | 55044                         | 5 <i>c</i> |    |
| 1189.3               | 56356                         | 3 <i>b</i> |        | 1299.7               | 55036                         | 2 <i>c</i> |    |
| 1190.1               | 56345                         | 2 <i>b</i> |        | 1302.0               | 55012                         | 2 <i>c</i> |    |
| 1193.1               | 56307                         | 3 <i>a</i> |        | 1303.5               | 54994                         | 5 <i>c</i> |    |
| 1199.6               | 56223                         | 2 <i>d</i> |        | 1306.7               | 54958                         | 5 <i>c</i> |    |
| 1200.6               | 56210                         | 4 <i>b</i> | Fe     | 1315.0               | 54865                         | 4 <i>c</i> |    |
| 1201.0               | 56204                         | 2 <i>a</i> |        | 1315.7               | 54857                         | 2 <i>b</i> |    |
| 1203.5               | 56175                         | 2 <i>c</i> |        | 1319.0               | 54821                         | 3 <i>c</i> | Co |
| 1204.2               | 56166                         | 2 <i>c</i> |        | 1320.6               | 54805                         | 4 <i>c</i> | Sr |
| 1204.9               | 56158                         | 2 <i>d</i> |        | 1321.1               | 54797                         | 3 <i>b</i> |    |
| 1206.1               | 56143                         | 1 <i>c</i> |        | 1323.3               | 54773                         | 2 <i>b</i> |    |
| 1207.3               | 56129                         | 5 <i>g</i> | Fe     | 1324.0               | 54765                         | 2 <i>b</i> |    |
| 1217.8               | 55997                         | 5 <i>d</i> | Fe, Ca | 1324.8               | 54757                         | 4 <i>d</i> | Ni |
| 1219.2               | 55981                         | 3 <i>c</i> | Ca     | 1325.3               | 54751                         | 2 <i>d</i> |    |
| 1220.1               | 55970                         | 2 <i>c</i> |        | 1327.7               | 54726                         | 4 <i>b</i> |    |
| 1221.6               | 55951                         | 5 <i>d</i> | Ca     | 1328.7               | 54715                         | 2 <i>b</i> |    |
| 1224.7               | 55913                         | 5 <i>d</i> | Ca     | 1330.4               | 54696                         | 3 <i>b</i> |    |
| 1225.3               | 55904                         | 1 <i>b</i> |        | 1333.3               | 54665                         | 1 <i>a</i> |    |
| 1226.6               | 55888                         | 2 <i>d</i> |        | 1334.0               | 54657                         | 4 <i>b</i> |    |
| 1228.3               | 55868                         | 2 <i>d</i> | Ca     | 1336.3               | 54634                         | 1 <i>b</i> |    |
| 1229.6               | 55852                         | 4 <i>c</i> | Ca     | 1337.0               | 54626                         | 4 <i>d</i> | Fe |
| 1230.5               | 55842                         | 2 <i>c</i> |        | 1337.8               | 54618                         | 1 <i>b</i> |    |
| 1231.3               | 55833                         | 5 <i>d</i> | Fe     | 1338.5               | 54609                         | 1 <i>b</i> |    |
| 1232.8               | 55814                         | 2 <i>b</i> |        | 1343.5               | 54556                         | 6 <i>c</i> | Fe |
| 1235.0               | 55787                         | 3 <i>d</i> | Ca     | 1351.1               | 54477                         | 5 <i>d</i> | Fe |
| 1237.8               | 55752                         | 2 <i>c</i> |        | 1352.7               | 54456                         | 5 <i>b</i> | Fe |
| 1239.9               | 55728                         | 4 <i>a</i> | Fe     | 1356.5               | 54417                         | 1 <i>a</i> |    |
| 1242.6               | 55696                         | 6 <i>c</i> | Fe     | 1360.9               | 54373                         | 1 <i>a</i> |    |
| 1245.6               | 55660                         | 4 <i>d</i> | Fe     | 1361.6               | 54365                         | 1 <i>a</i> |    |
| 1247.4               | 55639                         | 3 <i>b</i> |        | 1362.9               | 54351                         | 5 <i>b</i> | Fe |
| 1248.6               | 55625                         | 3 <i>d</i> |        | 1364.3               | 54337                         | 1 <i>a</i> |    |
| 1250.4               | 55605                         | 3 <i>c</i> |        | 1364.7               | 54333                         | 1 <i>a</i> |    |
| 1251.1               | 55597                         | 2 <i>b</i> |        | 1367.0               | 54309                         | 6 <i>d</i> | Fe |
| 1253.3               | 55571                         | 2 <i>b</i> |        | 1371.4               | 54262                         | 1 <i>b</i> | Ba |
| 1255.2               | 55548                         | 2 <i>b</i> |        | 1372.1               | 54255                         | 1 <i>b</i> |    |
| 1257.5               | 55521                         | 3 <i>c</i> |        | 1372.6               | 54250                         | 5 <i>b</i> | Fe |
| 1258.5               | 55510                         | 2 <i>b</i> |        | 1374.8               | 54226                         | 1 <i>c</i> |    |

TABLE (continued).

| Kirchhoff's measure. | Wave-length,<br>m.m.<br>0.000 |            |    | Kirchhoff's measure. | Wave-length,<br>m.m.<br>0.000 |            |        |
|----------------------|-------------------------------|------------|----|----------------------|-------------------------------|------------|--------|
| 1375.8               | 54214                         | 2 <i>a</i> |    | 1483.0               | 53158                         | 4 <i>b</i> |        |
| 1377.4               | 54198                         | 1 <i>a</i> |    | 1487.7               | 53113                         | 5 <i>b</i> | Fe     |
| 1379.0               | 54181                         | 1 <i>a</i> |    | 1489.2               | 53098                         | 2 <i>c</i> |        |
| 1380.5               | 54167                         | 4 <i>c</i> | Fe | 1489.9               | 53093                         | 1 <i>a</i> |        |
| 1384.7               | 54121                         | 4 <i>c</i> | Fe | (1491.2              | 53081                         | 1 <i>c</i> |        |
| 1385.7               | 54112                         | 5 <i>b</i> | Cr | 1491.6               | 53078                         | 3 <i>c</i> |        |
| 1386.3               | 54107                         | 2 <i>b</i> |    | 1492.4               | 53070                         | 4 <i>b</i> |        |
| 1387.4               | 54096                         | 2 <i>b</i> |    | 1493.1               | 53064                         | 4 <i>b</i> |        |
| 1389.4               | 54076                         | 6 <i>c</i> | Fe | 1494.5               | 53050                         | 1 <i>a</i> |        |
| 1390.9               | 54063                         | 5 <i>d</i> | Fe | 1495.9               | 53036                         | 1 <i>a</i> |        |
| 1394.2               | 54028                         | 4 <i>c</i> |    | 1497.3               | 53024                         | 1 <i>a</i> | Cu     |
| 1395.3               | 54017                         | 1 <i>c</i> |    | 1501.3               | 52988                         | 2 <i>b</i> |        |
| 1396.4               | 54006                         | 2 <i>c</i> |    | 1504.8               | 52956                         | 1 <i>a</i> |        |
| 1397.5               | 53995                         | 5 <i>c</i> | Fe | 1505.3               | 52950                         | 1 <i>a</i> |        |
| 1400.2               | 53964                         | 3 <i>b</i> |    | 1505.7               | 52947                         | 1 <i>a</i> |        |
| 1401.6               | 53949                         | 4 <i>c</i> | Fe | 1506.3               | 52941                         | 5 <i>c</i> | Fe     |
| 1403.1               | 53936                         | 3 <i>c</i> |    | 1508.6               | 52919                         | 5 <i>b</i> | Fe     |
| 1404.1               | 53927                         | 1 <i>b</i> |    | 1510.3               | 52904                         | 2 <i>c</i> | Co     |
| 1405.2               | 53916                         | 3 <i>b</i> |    | 1515.5               | 52855                         | 4 <i>d</i> |        |
| 1410.5               | 53862                         | 4 <i>c</i> | Fe | 1516.5               | 52847                         | 4 <i>c</i> |        |
| 1412.5               | 53842                         | 2 <i>b</i> |    | 1519.0               | 52823                         | 4 <i>d</i> |        |
| 1414.0               | 53828                         | 2 <i>b</i> |    | E { 1522.7           | 52792                         | 6 <i>c</i> | Fe, Ca |
| 1415.8               | 53809                         | 2 <i>b</i> |    | 1523.7               | 52782                         | 6 <i>c</i> | Fe     |
| 1419.4               | 53771                         | 2 <i>b</i> |    | 1525.0               | 52770                         | 1 <i>b</i> | Co     |
| 1421.5               | 53749                         | 6 <i>c</i> | Fe | 1527.7               | 52747                         | 5 <i>c</i> | Fe, Co |
| 1423.0               | 53736                         | 5 <i>b</i> | Fe | 1528.7               | 52739                         | 5 <i>c</i> | Ca     |
| 1423.5               | 53730                         | 2 <i>b</i> |    | 1530.2               | 52725                         | 4 <i>c</i> | Ca     |
| 1425.4               | 53713                         | 5 <i>b</i> | Fe | 1531.2               | 52715                         | 4 <i>c</i> |        |
| 1427.5               | 53690                         | 3 <i>b</i> |    | 1532.5               | 52705                         | 4 <i>b</i> | Ca     |
| 1428.2               | 53685                         | 5 <i>b</i> | Fe | 1533.1               | 52701                         | 4 <i>b</i> | Ca     |
| 1430.1               | 53666                         | 5 <i>b</i> |    | (1541.4              | 52622                         | 1 <i>g</i> |        |
| 1431.2               | 53655                         | 1 <i>b</i> |    | 1541.9               | 52618                         | 3 <i>b</i> |        |
| 1438.9               | 53579                         | 4 <i>c</i> | Co | 1543.7               | 52601                         | 2 <i>a</i> |        |
| 1440.2               | 53568                         | 1 <i>b</i> | Co | 1545.5               | 52584                         | 2 <i>a</i> |        |
| 1443.1               | 53541                         | 2 <i>b</i> |    | 1547.2               | 52569                         | 3 <i>a</i> |        |
| 1443.5               | 53536                         | 2 <i>b</i> | Ca | 1547.7               | 52565                         | 2 <i>a</i> |        |
| 1444.4               | 53528                         | 4 <i>c</i> |    | 1551.0               | 52539                         | 2 <i>a</i> |        |
| 1446.7               | 53508                         | 4 <i>c</i> |    | 1551.6               | 52532                         | 2 <i>a</i> |        |
| 1448.7               | 53488                         | 2 <i>a</i> | Co | 1555.6               | 52495                         | 2 <i>a</i> |        |
| 1449.4               | 53479                         | 1 <i>a</i> | Co | 1557.3               | 52481                         | 3 <i>a</i> |        |
| 1450.8               | 53463                         | 5 <i>c</i> | Fe | 1561.0               | 52450                         | 1 <i>a</i> |        |
| 1451.8               | 53454                         | 5 <i>b</i> | Fe | 1564.2               | 52423                         | 1 <i>a</i> |        |
| 1453.7               | 53436                         | 1 <i>a</i> |    | 1566.5               | 52401                         | 2 <i>b</i> | Co     |
| 1454.7               | 53425                         | 3 <i>b</i> |    | 1567.5               | 52392                         | 2 <i>b</i> |        |
| 1456.6               | 53408                         | 1 <i>a</i> |    | 1569.6               | 52375                         | 5 <i>c</i> | Fe     |
| 1458.6               | 53388                         | 3 <i>c</i> |    | 1573.5               | 52341                         | 5 <i>a</i> |        |
| 1461.5               | 53359                         | 2 <i>c</i> |    | 1575.4               | 52325                         | 1 <i>b</i> |        |
| 1462.2               | 53351                         | 2 <i>c</i> |    | (1577.2              | 52309                         | 5 <i>c</i> | Fe     |
| 1462.8               | 53346                         | 5 <i>c</i> | Fe | 1577.6               | 52306                         | 3 <i>c</i> |        |
| 1463.3               | 53343                         | 5 <i>c</i> | Fe | 1579.4               | 52292                         | 2 <i>a</i> |        |
| 1464.8               | 53326                         | 1 <i>a</i> |    | 1580.1               | 52286                         | 2 <i>a</i> |        |
| 1465.3               | 53323                         | 1 <i>a</i> |    | 1588.3               | 52215                         | 1 <i>g</i> | Cu     |
| 1466.8               | 53309                         | 5 <i>c</i> | Fe | 1589.1               | 52208                         | 3 <i>b</i> |        |
| 1468.8               | 53289                         | 2 <i>b</i> |    | 1590.7               | 52195                         | 3 <i>b</i> |        |
| 1469.6               | 53280                         | 1 <i>b</i> |    | 1592.3               | 52180                         | 3 <i>b</i> |        |
| 1473.9               | 53243                         | 5 <i>b</i> | Fe | 1598.9               | 52123                         | 2 <i>b</i> |        |
| 1475.3               | 53229                         | 1 <i>a</i> |    | (1601.4              | 52102                         | 6 <i>b</i> | Cr     |
| 1476.8               | 53215                         | 1 <i>a</i> |    | 1601.7               | 52099                         | 3 <i>d</i> |        |
| 1477.5               | 53208                         | 1 <i>a</i> |    | 1604.4               | 52077                         | 5 <i>b</i> | Cr     |

TABLE (continued).

| Kirchhoff's measure.           | Wave-length,<br>m.m.<br>0.000 |            |        | Kirchhoff's measure. | Wave-length,<br>m.m.<br>0.000 |            |    |
|--------------------------------|-------------------------------|------------|--------|----------------------|-------------------------------|------------|----|
| 1606.4                         | 52060                         | 5 <i>b</i> | Cr     | 1710.7               | 51213                         | 5 <i>a</i> |    |
| 1609.2                         | 52033                         | 5 <i>b</i> |        | 1712.2               | 51201                         | 3 <i>b</i> |    |
| 1611.3                         | 52017                         | 1 <i>c</i> |        | 1713.4               | 51193                         | 5 <i>b</i> |    |
| 1613.9                         | 51996                         | 3 <i>b</i> |        | 1715.2               | 51178                         | 4 <i>b</i> |    |
| 1615.6                         | 51982                         | 2 <i>b</i> |        | 1717.9               | 51157                         | 4 <i>b</i> |    |
| 1616.6                         | 51976                         | 1 <i>b</i> |        | 1719.4               | 51145                         | 1 <i>c</i> |    |
| 1617.4                         | 51968                         | 2 <i>b</i> |        | 1726.9               | 51087                         | 1 <i>a</i> |    |
| 1618.2                         | 51961                         | 3 <i>b</i> |        | 1727.3               | 51084                         | 3 <i>b</i> | Ni |
| 1618.9                         | 51956                         | 4 <i>b</i> |        | 1733.6               | 51035                         | 5 <i>b</i> |    |
| 1621.5                         | 51932                         | 1 <i>b</i> |        | 1734.6               | 51027                         | 3 <i>b</i> |    |
| 1622.3                         | 51925                         | 5 <i>c</i> | Fe     | 1737.7               | 51002                         | 5 <i>d</i> |    |
| 1623.4                         | 51915                         | 5 <i>b</i> | Fe     | 1741.0               | 50976                         | 4 <i>b</i> | Cu |
| 1627.2                         | 51883                         | 5 <i>b</i> | Ca     | 1742.7               | 50964                         | 1 <i>a</i> |    |
| 1628.2                         | 51875                         | 1 <i>b</i> |        | 1743.1               | 50961                         | 1 <i>a</i> |    |
| 1631.5                         | 51848                         | 1 <i>b</i> |        | 1744.6               | 50950                         | 2 <i>a</i> |    |
| <i>b</i> { 1633.5              | 51832                         | 4 <i>g</i> |        | 1748.9               | 50917                         | 3 <i>c</i> | Ni |
| 1634.1                         | 51826                         | 6 <i>g</i> | Mg     | 1749.6               | 50912                         | 2 <i>d</i> | Ni |
| 1634.7                         | 51821                         | 4 <i>g</i> |        | 1750.4               | 50906                         | 5 <i>c</i> |    |
| 1638.7                         | 51790                         | 1 <i>b</i> |        | 1752.0               | 50896                         | 2 <i>b</i> |    |
| 1642.1                         | 51761                         | 1 <i>b</i> |        | 1752.8               | 50889                         | 4 <i>c</i> |    |
| 1643.0                         | 51754                         | 1 <i>b</i> | Ni     | 1762.0               | 50821                         | 3 <i>c</i> |    |
| 1647.3                         | 51718                         | 5 <i>a</i> |        | 1771.5               | 50748                         | 3 <i>c</i> |    |
| 1648.4                         | 51709                         | 4 <i>e</i> |        | 1772.5               | 50741                         | 3 <i>c</i> |    |
| <i>b</i> <sub>1</sub> { 1648.8 | 51705                         | 6 <i>f</i> | Mg     | 1774.0               | 50729                         | 2 <i>b</i> |    |
| 1649.2                         | 51702                         | 4 <i>e</i> |        | 1775.8               | 50716                         | 3 <i>b</i> | Ni |
| 1650.3                         | 51693                         | 6 <i>b</i> | Fe     | 1776.5               | 50712                         | 3 <i>c</i> | Ni |
| <i>b</i> <sub>2</sub> { 1653.7 | 51664                         | 6 <i>b</i> | Fe, Ni | 1777.5               | 50704                         | 3 <i>c</i> |    |
| 1654.0                         | 51661                         | 4 <i>c</i> |        | 1778.5               | 50696                         | 3 <i>e</i> |    |
| 1655.6                         | 51647                         | 6 <i>e</i> | Fe, Mg | 1782.7               | 50665                         | 3 <i>b</i> |    |
| 1655.9                         | 51644                         | 4 <i>d</i> |        | 1784.4               | 50651                         | 1 <i>b</i> |    |
| 1657.1                         | 51635                         | 5 <i>b</i> |        | 1785.0               | 50647                         | 4 <i>b</i> |    |
| (to 1658.3                     | 51627                         | 2 <i>b</i> |        | 1787.7               | 50626                         | 2 <i>c</i> |    |
| 1659.4                         | 51618                         | 1          |        | 1788.7               | 50618                         | 3 <i>b</i> |    |
| 1662.8                         | 51592                         | 5 <i>b</i> | Fe     | 1793.8               | 50583                         | 4 <i>b</i> |    |
| 1667.4                         | 51554                         | 3 <i>a</i> |        | 1795.4               | 50571                         | 1 <i>a</i> |    |
| 1670.3                         | 51531                         | 1 <i>a</i> |        | 1796.0               | 50567                         | 3 <i>a</i> |    |
| 1671.5                         | 51522                         | 3 <i>b</i> |        | 1797.8               | 50555                         | 1 <i>a</i> |    |
| 1672.2                         | 51517                         | 4 <i>a</i> | Ni     | 1799.0               | 50546                         | 4 <i>c</i> |    |
| 1673.7                         | 51506                         | 4 <i>a</i> |        | 1799.6               | 50542                         | 3 <i>b</i> |    |
| 1674.7                         | 51497                         | 3 <i>c</i> | Cu     | 1806.4               | 50492                         | 2 <i>b</i> |    |
| (1676.2                        | 51484                         | 2 <i>d</i> |        | 1818.7               | 50403                         | 5 <i>b</i> |    |
| 1676.5                         | 51481                         | 4 <i>b</i> |        | 1821.4               | 50384                         | 5 <i>b</i> |    |
| 1677.9                         | 51469                         | 4 <i>c</i> |        | 1822.6               | 50376                         | 3 <i>a</i> |    |
| 1681.6                         | 51438                         | 4 <i>c</i> |        | 1823.2               | 50371                         | 2 <i>a</i> |    |
| 1684.0                         | 51421                         | 4 <i>a</i> | Ni     | 1823.6               | 50368                         | 2 <i>a</i> |    |
| 1684.4                         | 51418                         | 1 <i>b</i> |        | 1828.6               | 50330                         | 1 <i>b</i> |    |
| 1685.9                         | 51404                         | 2 <i>a</i> |        | 1830.1               | 50320                         | 3 <i>b</i> |    |
| 1686.3                         | 51401                         | 2 <i>a</i> |        | 1832.8               | 50302                         | 2 <i>a</i> | Ca |
| 1689.5                         | 51377                         | 5 <i>c</i> |        | 1833.4               | 50298                         | 6 <i>c</i> |    |
| 1690.0                         | 51373                         | 5 <i>b</i> | Ni     | 1834.3               | 50292                         | 6 <i>c</i> |    |
| 1691.0                         | 51365                         | 5 <i>b</i> |        | 1835.9               | 50282                         | 3 <i>b</i> |    |
| 1693.8                         | 51343                         | 6 <i>e</i> | Fe     | 1836.7               | 50276                         | 3 <i>c</i> |    |
| 1696.5                         | 51321                         | 3 <i>c</i> |        | 1837.5               | 50271                         | 3 <i>c</i> |    |
| 1697.0                         | 51317                         | 3 <i>c</i> | Ni     | 1841.0               | 50244                         | 4 <i>b</i> |    |
| 1701.8                         | 51281                         | 5 <i>c</i> | Fe     | 1841.6               | 50240                         | 4 <i>b</i> |    |
| (1704.6                        | 51259                         | 2 <i>c</i> |        | 1842.2               | 50236                         | 4 <i>b</i> | Ni |
| 1704.9                         | 51257                         | 3 <i>b</i> |        | 1848.9               | 50189                         | 2 <i>c</i> |    |
| (1707.6                        | 51236                         | 2 <i>c</i> |        | 1851.0               | 50173                         | 1 <i>c</i> |    |
| 1707.9                         | 51234                         | 3 <i>b</i> |        | 1853.2               | 50157                         | 3 <i>b</i> |    |

TABLE (continued).

| Kirchhoff's measure. | Wave-length,<br>m.m.<br>0.000 |            |          | Kirchhoff's measure. | Wave-length,<br>m.m.<br>0.000 |            |                |
|----------------------|-------------------------------|------------|----------|----------------------|-------------------------------|------------|----------------|
| 1854.0               | 50152                         | 2 <i>b</i> | Fe<br>Ni | 1966.2               | 49398                         | 2 <i>b</i> | Ni<br>Ba       |
| 1854.9               | 50146                         | 4 <i>c</i> |          | 1966.7               | 49394                         | 2 <i>b</i> |                |
| 1856.9               | 50133                         | 1 <i>c</i> |          | 1970.1               | 49373                         | 3 <i>b</i> |                |
| 1857.9               | 50127                         | 2 <i>b</i> |          | 1974.7               | 49344                         | 4 <i>b</i> |                |
| 1860.4               | 50108                         | 2 <i>b</i> |          | 1975.7               | 49337                         | 2 <i>d</i> |                |
| 1861.3               | 50102                         | 3 <i>c</i> |          | 1979.2               | 49316                         | 3 <i>c</i> |                |
| 1862.3               | 50095                         | 2 <i>b</i> |          | 1982.8               | 49293                         | 5 <i>a</i> |                |
| 1864.9               | 50079                         | 3 <i>b</i> |          | 1983.3               | 49289                         | 5 <i>a</i> |                |
| 1867.1               | 50063                         | 5 <i>d</i> |          | 1983.8               | 49286                         | 5 <i>a</i> |                |
| 1868.4               | 50054                         | 5 <i>b</i> |          | 1984.5               | 49282                         | 4 <i>b</i> |                |
| 1869.5               | 50046                         | 1 <i>c</i> |          | 1985.8               | 49273                         | 4 <i>b</i> |                |
| 1870.6               | 50038                         | 3 <i>a</i> |          | 1986.9               | 49266                         | 2 <i>a</i> |                |
| 1872.4               | 50025                         | 5 <i>b</i> |          | 1987.5               | 49263                         | 3 <i>a</i> |                |
| 1873.4               | 50018                         | 6 <i>b</i> |          | 1989.5               | 49250                         | 6 <i>c</i> |                |
| 1874.2               | 50013                         | 2 <i>a</i> |          | 1990.4               | 49243                         | 5 <i>b</i> |                |
| 1874.8               | 50009                         | 2 <i>a</i> |          | 1991.8               | 49234                         | 1 <i>b</i> |                |
| 1875.8               | 50002                         | 2 <i>c</i> |          | 1994.1               | 49219                         | 5 <i>b</i> |                |
| 1876.5               | 49997                         | 6 <i>b</i> |          | 1996.9               | 49201                         | 2 <i>a</i> |                |
| 1884.3               | 49945                         | 6 <i>b</i> |          | 1997.5               | 49198                         | 2 <i>a</i> |                |
| 1885.8               | 49933                         | 6 <i>b</i> |          | 1999.6               | 49184                         | 2 <i>c</i> |                |
| 1886.4               | 49929                         | 6 <i>b</i> |          | 2000.6               | 49176                         | 5 <i>a</i> | Fe             |
| 1889.5               | 49908                         | 1 <i>g</i> | Ni       | 2001.6               | 49169                         | 5 <i>c</i> |                |
| 1891.0               | 49898                         | 3 <i>b</i> |          | 2003.2               | 49159                         | 3 <i>b</i> |                |
| 1892.5               | 49890                         | 5 <i>b</i> |          | 2003.7               | 49157                         | 1 <i>a</i> |                |
| 1893.8               | 49879                         | 1 <i>b</i> |          | (2004.9              | 49149                         | 2 <i>d</i> | Fe<br>Fe<br>Ni |
| 1894.8               | 49871                         | 3 <i>b</i> |          | (2005.2              | 49148                         | 6 <i>d</i> |                |
| 1896.2               | 49861                         | 4 <i>b</i> |          | 2007.2               | 49135                         | 6 <i>c</i> |                |
| 1897.9               | 49850                         | 1 <i>c</i> |          | 2008.1               | 49129                         | 1 <i>b</i> |                |
| 1900.0               | 49835                         | 1 <i>c</i> |          | 2008.6               | 49125                         | 1 <i>b</i> | Ni             |
| 1904.5               | 49806                         | 4 <i>b</i> |          | 2009.8               | 49118                         | 2 <i>b</i> |                |
| 1905.1               | 49802                         | 2 <i>c</i> |          | 2013.9               | 49094                         | 2 <i>a</i> |                |
| 1908.5               | 49778                         | 5 <i>d</i> | Ni       | 2014.3               | 49092                         | 2 <i>a</i> |                |
| 1911.9               | 49755                         | 3 <i>c</i> |          | (2015.7              | 49083                         | } 1        | Fe<br>Fe<br>Ni |
| 1916.2               | 49726                         | 1 <i>d</i> |          | to 2016.9            | 49076                         |            |                |
| 1917.5               | 49719                         | 4 <i>b</i> |          | (2017.7              | 49070                         | 2 <i>b</i> |                |
| 1917.9               | 49716                         | 4 <i>b</i> |          | (2018.5              | 49066                         | 2 <i>b</i> |                |
| 1919.8               | 49704                         | 4 <i>b</i> |          | 2019.5               | 49061                         | 2 <i>a</i> | Ni             |
| 1920.2               | 49701                         | 4 <i>b</i> |          | 2021.2               | 49048                         | 1 <i>g</i> |                |
| 1921.1               | 49694                         | 4 <i>b</i> |          | 2024.9               | 49025                         | 1 <i>a</i> |                |
| 1922.0               | 49689                         | 4 <i>b</i> |          | 2025.7               | 49020                         | 4 <i>a</i> | Ba             |
| 1922.4               | 49686                         | 4 <i>b</i> |          | 2026.8               | 49012                         | 4 <i>b</i> |                |
| 1923.5               | 49678                         | 4 <i>b</i> | Ni       | 2031.1               | 48986                         | 2 <i>c</i> |                |
| 1925.8               | 49662                         | 4 <i>b</i> |          | 2035.4               | 48959                         | 1 <i>b</i> |                |
| 1928.0               | 49647                         | 4 <i>b</i> |          | 2039.6               | 48934                         | 1 <i>b</i> | Fe<br>Fe       |
| 1931.2               | 49625                         | 1 <i>c</i> |          | 2041.3               | 48923                         | 6 <i>c</i> |                |
| 1932.5               | 49618                         | 1 <i>c</i> |          | 2042.2               | 48917                         | 6 <i>b</i> |                |
| 1936.2               | 49593                         | 3 <i>c</i> |          | 2044.5               | 48904                         | 5 <i>b</i> |                |
| 1939.5               | 49574                         | 2 <i>c</i> |          | 2045.0               | 48901                         | 5 <i>b</i> | FeCa           |
| 1940.6               | 49566                         | 2 <i>c</i> |          | 2047.0               | 48888                         | 3 <i>d</i> |                |
| 1941.5               | 49561                         | 3 <i>b</i> |          | 2047.8               | 48884                         | 3 <i>b</i> |                |
| 1943.5               | 49548                         | 2 <i>c</i> |          | 2049.3               | 48874                         | 3 <i>a</i> |                |
| 1944.5               | 49543                         | 3 <i>b</i> |          | 2049.7               | 48873                         | 3 <i>a</i> |                |
| 1947.6               | 49522                         | 4 <i>c</i> |          | 2051.3               | 48862                         | 3 <i>c</i> |                |
| 1949.4               | 49510                         | 1 <i>c</i> |          | 2053.0               | 48851                         | 4 <i>b</i> |                |
| 1953.6               | 49482                         | 2 <i>b</i> |          | 2053.7               | 48846                         | 4 <i>c</i> |                |
| <sup>c</sup> (1960.8 | 49433                         | 6 <i>b</i> | } Fe     | 2058.0               | 48820                         | 6 <i>c</i> |                |
| 1961.2               | 49431                         | 6 <i>b</i> |          | 2060.0               | 48808                         | 2 <i>b</i> |                |
| 1964.3               | 49412                         | 2 <i>c</i> |          | 2060.6               | 48804                         | 2 <i>a</i> |                |

TABLE (continued).

| Kirchhoff's measure. | Wave-length,<br>m.m.<br>0.000 |            |    | Kirchhoff's measure. | Wave-length,<br>m.m.<br>0.000 |            |        |
|----------------------|-------------------------------|------------|----|----------------------|-------------------------------|------------|--------|
| 2061.0               | 48802                         | 1 <i>a</i> |    | 2148.5               | 48284                         | 4 <i>a</i> |        |
| 2064.7               | 48778                         | 2 <i>c</i> | Ni | 2148.9               | 48282                         | 3 <i>a</i> |        |
| 2066.2               | 48769                         | 5 <i>c</i> | Fe | 2150.1               | 48277                         | 3 <i>a</i> |        |
| 2067.1               | 48764                         | 5 <i>c</i> | Fe | 2150.5               | 48276                         | 3 <i>a</i> |        |
| 2067.8               | 48761                         | 3 <i>b</i> |    | 2157.0               | 48239                         | 3 <i>a</i> | Co, Au |
| 2068.8               | 48755                         | 3 <i>b</i> |    | 2157.4               | 48237                         | 5 <i>a</i> |        |
| 2070.6               | 48743                         | 1 <i>b</i> |    | 2159.0               | 48229                         | 1 <i>c</i> |        |
| 2071.3               | 48739                         | 1 <i>b</i> | Co | 2160.6               | 48219                         | 5 <i>a</i> |        |
| 2073.5               | 48728                         | 3 <i>b</i> | Ni | 2160.9               | 48217                         | 4 <i>a</i> |        |
| 2074.6               | 48721                         | 2 <i>b</i> |    | 2161.7               | 48213                         | 4 <i>a</i> |        |
| 2076.5               | 48709                         | 1 <i>b</i> |    | 2162.6               | 48207                         | 3 <i>a</i> |        |
| 2077.3               | 48704                         | 2 <i>b</i> |    | 2163.7               | 48201                         | 4 <i>a</i> |        |
| F (2079.5            | 48690                         | 4 <i>e</i> |    | 2164.0               | 48198                         | 4 <i>a</i> | Ni     |
| (2080.0              | 48689                         | 6 <i>g</i> |    | 2167.5               | 48178                         | 6 <i>b</i> |        |
| (2080.5              | 48686                         | 4 <i>e</i> |    | 2171.5               | 48155                         | 3 <i>b</i> | Co     |
| 2082.0               | 48676                         | 6 <i>a</i> | Fe | 2172.2               | 48151                         | 2 <i>a</i> |        |
| 2084.6               | 48661                         | 2 <i>b</i> |    | 2175.7               | 48131                         | 2 <i>b</i> |        |
| (2086.0              | 48651                         | 1          |    | 2176.4               | 48127                         | 1 <i>b</i> |        |
| to (2086.9           | 48646                         |            |    | 2179.9               | 48107                         | 5 <i>b</i> |        |
| 2086.9               | 48646                         | 3 <i>b</i> | Ni | 2181.2               | 48100                         | 3 <i>e</i> |        |
| 2087.6               | 48642                         | 1 <i>a</i> |    | 2184.9               | 48080                         | 5 <i>b</i> |        |
| 2089.7               | 48632                         | 1 <i>a</i> |    | 2186.5               | 48072                         | 3 <i>b</i> |        |
| 2090.9               | 48625                         | 1 <i>a</i> |    | 2187.1               | 48069                         | 5 <i>a</i> |        |
| 2094.0               | 48606                         | 2 <i>b</i> |    | 2187.9               | 48064                         | 5 <i>a</i> |        |
| 2096.8               | 48589                         | 1 <i>b</i> |    | 2188.5               | 48061                         | 5 <i>a</i> |        |
| 2098.8               | 48577                         | 1 <i>a</i> |    | 2190.1               | 48052                         | 5 <i>b</i> |        |
| 2099.8               | 48573                         | 2 <i>a</i> |    | (2191.9              | 48042                         | 3 <i>e</i> |        |
| 2100.4               | 48569                         | 1 <i>a</i> |    | 2192.3               | 48039                         | 5 <i>b</i> |        |
| 2102.6               | 48556                         | 4 <i>a</i> |    | 2193.3               | 48034                         | 5 <i>a</i> |        |
| 2103.3               | 48552                         | 4 <i>b</i> |    | 2195.7               | 48017                         | 2 <i>b</i> |        |
| 2104.0               | 48548                         | 4 <i>a</i> |    | 2197.1               | 48010                         | 2 <i>b</i> |        |
| 2105.1               | 48543                         | 4 <i>b</i> |    | 2197.7               | 48007                         | 2 <i>b</i> |        |
| 2107.0               | 48531                         | 1 <i>a</i> |    | 2198.8               | 48000                         | 4 <i>a</i> |        |
| 2107.4               | 48528                         | 2 <i>a</i> |    | 2199.2               | 47998                         | 3 <i>a</i> | Ni     |
| 2109.1               | 48520                         | 2 <i>b</i> |    | 2201.1               | 47988                         | 2 <i>b</i> |        |
| 2111.1               | 48507                         | 3 <i>b</i> |    | 2201.9               | 47983                         | 5 <i>c</i> |        |
| 2112.7               | 48497                         | 3 <i>b</i> | Ni | 2203.3               | 47975                         | 2 <i>a</i> |        |
| 2115.0               | 48484                         | 3 <i>a</i> | Ni | 2203.8               | 47973                         | 1 <i>a</i> |        |
| 2115.4               | 48481                         | 3 <i>a</i> |    | 2205.1               | 47965                         | 1 <i>b</i> |        |
| 2119.8               | 48456                         | 1 <i>b</i> |    | 2206.4               | 47958                         | 1 <i>a</i> | Co     |
| 2121.2               | 48446                         | 4 <i>b</i> |    | 2206.7               | 47956                         | 1 <i>a</i> |        |
| 2121.9               | 48442                         | 5 <i>c</i> |    | 2209.1               | 47943                         | 4 <i>c</i> |        |
| 2124.3               | 48428                         | 1 <i>b</i> |    | 2211.7               | 47928                         | 4 <i>b</i> |        |
| 2125.1               | 48424                         | 2 <i>b</i> |    | 2213.4               | 47918                         | 4 <i>b</i> |        |
| 2127.7               | 48408                         | 3 <i>b</i> |    | 2215.1               | 47909                         | 1 <i>b</i> |        |
| 2132.3               | 48379                         | 2 <i>a</i> | Co | 2216.7               | 47900                         | 3 <i>b</i> |        |
| 2132.7               | 48376                         | 1 <i>a</i> |    | 2217.5               | 47895                         | 3 <i>b</i> |        |
| 2133.8               | 48369                         | 2 <i>a</i> |    | 2218.3               | 47890                         | 3 <i>a</i> |        |
| 2134.3               | 48367                         | 1 <i>a</i> |    | 2219.8               | 47882                         | 3 <i>b</i> |        |
| 2136.0               | 48357                         | 5 <i>a</i> | Zn | 2221.3               | 47873                         | 1 <i>a</i> |        |
| (2138.0              | 48346                         | 2 <i>g</i> |    | 2221.7               | 47871                         | 1 <i>a</i> |        |
| 2138.4               | 48343                         | 4 <i>a</i> |    | 2222.3               | 47868                         | 5 <i>c</i> |        |
| 2139.5               | 48336                         | 4 <i>a</i> |    | 2223.5               | 47862                         | 3 <i>c</i> |        |
| 2140.4               | 48331                         | 4 <i>a</i> |    | 2225.4               | 47851                         | 2 <i>b</i> |        |
| 2141.9               | 48322                         | 2 <i>a</i> |    | 2226.2               | 47845                         | 4 <i>b</i> |        |
| 2142.4               | 48319                         | 5 <i>a</i> |    | 2227.6               | 47837                         | 2 <i>a</i> |        |
| 2144.6               | 48307                         | 4 <i>a</i> |    | 2228.6               | 47832                         | 2 <i>a</i> |        |
| 2146.9               | 48293                         | 3 <i>a</i> |    | 2229.1               | 47829                         | 4 <i>a</i> |        |
| 2147.4               | 48291                         | 4 <i>a</i> |    | 2230.7               | 47820                         | 4 <i>a</i> |        |

TABLE (continued).

| Kirchhoff's measure. | Wave-length,<br>m.m.<br>0.000 |            |    | Kirchhoff's measure. | Wave-length,<br>m.m.<br>0.000 |            |    |
|----------------------|-------------------------------|------------|----|----------------------|-------------------------------|------------|----|
| 2231.2               | 47817                         | 2 <i>a</i> | Zn | 2316.0               | 47344                         | 2 <i>b</i> | Cu |
| 2232.3               | 47811                         | 4 <i>a</i> |    | 2316.6               | 47341                         | 1 <i>b</i> |    |
| (2233.7              | 47803                         | 5 <i>c</i> |    | 2322.0               | 47311                         | 2 <i>b</i> |    |
| 2234.0               | 47801                         | 2 <i>c</i> |    | 2323.0               | 47306                         | 2 <i>b</i> |    |
| 2237.4               | 47784                         | 1 <i>b</i> |    | 2325.3               | 47291                         | 6 <i>d</i> |    |
| 2238.7               | 47778                         | 1 <i>b</i> |    | 2328.3               | 47275                         | 5 <i>b</i> |    |
| 2240.0               | 47769                         | 3 <i>b</i> |    | 2329.5               | 47269                         | 5 <i>b</i> |    |
| 2241.4               | 47760                         | 2 <i>b</i> |    | (2332.8              | 47250                         | 2 <i>b</i> |    |
| 2245.1               | 47739                         | 3 <i>b</i> |    | 2333.0               | 47248                         | 5 <i>b</i> |    |
| 2246.2               | 47733                         | 1 <i>b</i> |    | 2334.1               | 47242                         | 2 <i>d</i> | Ni |
| 2248.2               | 47722                         | 3 <i>c</i> | Ni | 2335.0               | 47237                         | 5 <i>b</i> |    |
| (2249.7              | 47715                         | 6 <i>a</i> |    | 2336.2               | 47231                         | 2 <i>d</i> |    |
| 2250.0               | 47712                         | 3 <i>d</i> |    | 2336.8               | 47228                         | 5 <i>b</i> |    |
| 2255.4               | 47682                         | 4 <i>b</i> |    | 2339.9               | 47213                         | 4 <i>b</i> |    |
| 2256.2               | 47678                         | 2 <i>b</i> |    | 2342.5               | 47198                         | 1 <i>d</i> |    |
| 2257.1               | 47673                         | 4 <i>d</i> |    | from (2343.7         | 47190                         | 1          |    |
| 2257.6               | 47670                         | 2 <i>b</i> |    | (2345.1              | 47181                         | 2 <i>d</i> |    |
| 2258.5               | 47666                         | 2 <i>c</i> |    | 2346.7               | 47172                         | 4 <i>b</i> |    |
| 2259.4               | 47663                         | 4 <i>c</i> |    | 2347.3               | 47168                         | 4 <i>b</i> |    |
| 2261.4               | 47652                         | 1 <i>b</i> | Zn | 2349.4               | 47157                         | 1 <i>b</i> | Ni |
| 2262.1               | 47649                         | 2 <i>a</i> |    | 2349.9               | 47155                         | 2 <i>b</i> |    |
| 2263.4               | 47642                         | 2 <i>a</i> |    | 2351.4               | 47145                         | 1 <i>c</i> |    |
| 2264.3               | 47638                         | 6 <i>d</i> |    | 2352.2               | 47141                         | 2 <i>b</i> |    |
| 2266.2               | 47627                         | 2 <i>a</i> |    | 2354.1               | 47130                         | 6 <i>c</i> |    |
| 2266.6               | 47625                         | 3 <i>a</i> |    | 2357.4               | 47112                         | 5 <i>a</i> |    |
| 2268.0               | 47616                         | 3 <i>a</i> |    | 2358.4               | 47104                         | 5 <i>b</i> |    |
| 2269.1               | 47611                         | 3 <i>a</i> |    | 2361.0               | 47090                         | 1 <i>d</i> |    |
| 2269.9               | 47607                         | 3 <i>a</i> |    | 2362.2               | 47084                         | 1 <i>c</i> |    |
| 2270.2               | 47605                         | 3 <i>a</i> |    | 2362.6               | 47083                         | 4 <i>b</i> |    |
| 2274.2               | 47587                         | 1 <i>d</i> | Zn | 2364.0               | 47074                         | 4 <i>b</i> | Ni |
| 2278.4               | 47560                         | 4 <i>c</i> |    | 2365.9               | 47064                         | 2 <i>b</i> |    |
| 2279.8               | 47554                         | 2 <i>a</i> |    | 2366.8               | 47059                         | 1 <i>b</i> |    |
| 2280.7               | 47548                         | 2 <i>a</i> |    | 2367.7               | 47054                         | 2 <i>b</i> |    |
| 2282.0               | 47541                         | 1 <i>a</i> |    | 2369.7               | 47044                         | 2 <i>b</i> |    |
| 2282.3               | 47539                         | 1 <i>b</i> |    | (2371.4              | 47033                         | 2 <i>b</i> |    |
| 2283.6               | 47531                         | 2 <i>a</i> |    | 2371.6               | 47032                         | 4 <i>b</i> |    |
| 2284.9               | 47524                         | 2 <i>b</i> |    | 2372.4               | 47027                         | 4 <i>b</i> |    |
| 2286.1               | 47518                         | 2 <i>b</i> |    | 2374.2               | 47016                         | 3 <i>b</i> |    |
| 2288.1               | 47506                         | 2 <i>a</i> |    | 2375.0               | 47013                         | 2 <i>b</i> |    |
| from (2289.1         | 47501                         | 1          | Cd | 2375.6               | 47010                         | 4 <i>b</i> | Ni |
| 2289.9               | 47496                         | 2 <i>b</i> |    | 2376.1               | 47006                         | 1 <i>b</i> |    |
| 2290.4               | 47493                         | 1 <i>b</i> |    | 2379.0               | 46989                         | 6 <i>c</i> |    |
| 2291.8               | 47486                         | 2 <i>g</i> |    | 2381.6               | 46975                         | 6 <i>c</i> |    |
| 2293.1               | 47478                         | 2 <i>a</i> |    | 2386.1               | 46951                         | 3 <i>b</i> |    |
|                      |                               | 1          |    | 2386.6               | 46948                         | 2 <i>a</i> |    |
| 2293.6               | 47474                         | 3 <i>b</i> |    | 2388.7               | 46935                         | 2 <i>c</i> |    |
| 2294.5               | 47469                         | 2 <i>b</i> |    | 2389.7               | 46929                         | 2 <i>c</i> |    |
| 2301.7               | 47428                         | 4 <i>c</i> |    | 2390.7               | 46924                         | 3 <i>a</i> |    |
| 2302.9               | 47420                         | 3 <i>b</i> |    | 2391.2               | 46920                         | 1 <i>b</i> |    |
| 2305.3               | 47404                         | 3 <i>d</i> | Zn | 2393.1               | 46911                         | 5 <i>b</i> | Ni |
| 2306.8               | 47397                         | 4 <i>c</i> |    | 2394.4               | 46904                         | 4 <i>a</i> |    |
| 2307.8               | 47391                         | 1 <i>b</i> |    | (2395.8              | 46896                         | 1 <i>f</i> |    |
| 2308.2               | 47389                         | 5 <i>b</i> |    | 2396.1               | 46895                         | 3 <i>b</i> |    |
| (2309.0              | 47385                         | 5 <i>c</i> |    | 2396.7               | 46892                         | 2 <i>a</i> |    |
| to 2310.4            | 47378                         | 1          |    |                      |                               | 1          |    |
| 2310.9               | 47375                         | 2 <i>c</i> |    | (2397.4              | 46887                         | 2 <i>a</i> |    |
| 2312.5               | 47365                         | 3 <i>b</i> |    | 2399.6               | 46875                         | 3 <i>a</i> |    |
| 2313.7               | 47358                         | 3 <i>b</i> |    | 2399.9               | 46874                         | 3 <i>a</i> |    |
| 2314.3               | 47354                         | 3 <i>b</i> |    | 2402.2               | 46858                         | 3 <i>b</i> |    |

TABLE (continued).

| Kirchhoff's measure. | Wave-length,<br>m.m.<br>0.000 |            |    | Kirchhoff's measure. | Wave-length,<br>m.m.<br>6.000 |            |    |
|----------------------|-------------------------------|------------|----|----------------------|-------------------------------|------------|----|
| 2403.2               | 46851                         | 3 <i>b</i> | Co | 2478.7               | 46404                         | 2 <i>a</i> | Co |
| 2404.9               | 46842                         | 2 <i>b</i> |    | 2479.7               | 46397                         | 2 <i>a</i> |    |
| 2406.2               | 46835                         | 2 <i>b</i> |    | 2480.1               | 46395                         | 2 <i>a</i> |    |
| 2406.6               | 46833                         | 6 <i>c</i> |    | 2481.1               | 46388                         | 1 <i>a</i> |    |
| 2407.2               | 46828                         | 1 <i>b</i> |    | 2482.1               | 46384                         | 1 <i>a</i> |    |
| 2408.2               | 46823                         | 4 <i>b</i> |    | 2482.4               | 36381                         | 1 <i>c</i> |    |
| 2409.0               | 46818                         | 1 <i>b</i> |    | 2486.6               | 46355                         | 5 <i>b</i> |    |
| 2410.2               | 46811                         | 4 <i>b</i> |    | 2487.0               | 46352                         | 5 <i>b</i> |    |
| 2412.8               | 46799                         | 3 <i>b</i> |    | 2488.2               | 46346                         | 4 <i>b</i> |    |
| 2414.7               | 46787                         | 2 <i>b</i> |    | 2489.4               | 46339                         | 5 <i>d</i> |    |
| (2416.0)             | 46780                         | 3 <i>d</i> |    | (2490.5)             | 46333                         | 5 <i>a</i> |    |
| (2416.3)             | 46777                         | 5 <i>b</i> |    | (2490.8)             | 46330                         | 3 <i>d</i> |    |
| 2418.0               | 46768                         | 3 <i>b</i> |    | 2493.0               | 46318                         | 3 <i>a</i> |    |
| 2419.3               | 46761                         | 5 <i>b</i> |    | (2493.6)             | 46314                         | 5 <i>a</i> |    |
| 2420.6               | 46753                         | 2 <i>b</i> |    | (2493.9)             | 46313                         | 3 <i>f</i> |    |
| 2422.3               | 46744                         | 6 <i>d</i> |    | 2495.8               | 46302                         | 5 <i>b</i> |    |
| 2423.8               | 46735                         | 3 <i>c</i> |    | 2497.2               | 46292                         | 6 <i>d</i> |    |
| 2424.4               | 46731                         | 4 <i>b</i> |    | 2499.0               | 46282                         | 3 <i>b</i> |    |
| 2426.5               | 46720                         | 4 <i>b</i> |    | 2499.8               | 46277                         | 3 <i>b</i> |    |
| 2428.4               | 46709                         | 1 <i>a</i> |    | 2500.3               | 46273                         | 4 <i>c</i> |    |
| 2429.5               | 46703                         | 3 <i>b</i> |    | (2502.2)             | 46262                         | 4 <i>c</i> | Ba |
| 2431.9               | 46689                         | 2 <i>b</i> |    | (2502.4)             | 46260                         | 1 <i>b</i> |    |
| 2432.4               | 46686                         | 1 <i>b</i> |    | 2505.6               | 46240                         | 4 <i>d</i> |    |
| (2435.3)             | 46668                         | 2 <i>b</i> |    | 2509.4               | 46218                         | 2 <i>d</i> |    |
| (2435.5)             | 46667                         | 5 <i>c</i> |    | 2512.1               | 46200                         | 1 <i>c</i> | Pt |
| (2435.7)             | 46665                         | 2 <i>b</i> |    | 2512.5               | 46198                         | 2 <i>a</i> |    |
| 2436.5               | 46660                         | 5 <i>a</i> |    | 2513.2               | 46194                         | 2 <i>b</i> |    |
| 2438.5               | 46649                         | 1 <i>a</i> |    | 2513.5               | 46192                         | 1 <i>b</i> |    |
| 2439.4               | 46644                         | 2 <i>b</i> |    | 2517.0               | 46170                         | 3 <i>b</i> |    |
| 2440.0               | 46640                         | 1 <i>a</i> |    | (2518.2)             | 46161                         | 2 <i>c</i> |    |
| 2441.8               | 46629                         | 2 <i>a</i> |    | (2518.4)             | 46159                         | 3 <i>a</i> |    |
| 2442.4               | 46626                         | 1 <i>a</i> |    | 2520.9               | 46145                         | 3 <i>a</i> |    |
| 2443.9               | 46617                         | 5 <i>a</i> |    | 2522.3               | 46136                         | 1 <i>a</i> |    |
| 2444.2               | 46615                         | 5 <i>a</i> |    | 2525.0               | 46120                         | 2 <i>a</i> |    |
| 2445.3               | 46609                         | 1 <i>c</i> |    | 2525.4               | 46117                         | 1 <i>b</i> |    |
| 2446.6               | 46601                         | 5 <i>b</i> |    | 2527.0               | 46106                         | 4 <i>a</i> |    |
| 2452.1               | 46570                         | 2 <i>c</i> | Ba | 2532.0               | 46075                         | 2 <i>b</i> |    |
| 2454.1               | 46555                         | 4 <i>b</i> |    | 2535.5               | 46052                         | 2 <i>b</i> |    |
| 2457.5               | 46537                         | 4 <i>b</i> |    | 2535.9               | 46049                         | 2 <i>b</i> |    |
| 2457.9               | 46534                         | 4 <i>b</i> |    | 2536.6               | 46045                         | 1 <i>b</i> |    |
| 2458.6               | 46530                         | 3 <i>a</i> |    | 2537.1               | 46042                         | 5 <i>c</i> |    |
| 2459.5               | 46524                         | 2 <i>b</i> |    | 2538.0               | 46035                         | 1 <i>b</i> |    |
| 2460.4               | 46518                         | 1 <i>c</i> |    | 2538.3               | 46033                         | 2 <i>a</i> |    |
| 2461.2               | 46513                         | 6 <i>b</i> |    | 2540.5               | 46021                         | 2 <i>g</i> |    |
| 2463.4               | 46499                         | 4 <i>b</i> |    | 2543.5               | 46002                         | 4 <i>c</i> |    |
| 2466.0               | 46482                         | 3 <i>a</i> |    | 2544.5               | 45995                         | 2 <i>d</i> |    |
| (2467.3)             | 46474                         | 3 <i>c</i> |    | 2545.4               | 45989                         | 1 <i>c</i> |    |
| (2467.6)             | 46472                         | 5 <i>c</i> |    | 2547.2               | 45976                         | 6 <i>c</i> |    |
| (2467.9)             | 46470                         | 3 <i>c</i> |    | 2547.7               | 45972                         | 2 <i>b</i> |    |
| 2468.7               | 46465                         | 3 <i>a</i> |    | 2548.4               | 45968                         | 1 <i>c</i> |    |
| 2470.1               | 46457                         | 4 <i>a</i> |    | 2549.7               | 45959                         | 1 <i>b</i> |    |
| (2471.2)             | 46450                         | 2 <i>b</i> |    | 2550.1               | 45956                         | 1 <i>b</i> |    |
| (2471.4)             | 46448                         | 4 <i>a</i> |    | (2551.2)             | 45948                         | 1 <i>b</i> |    |
| 2472.9               | 46439                         | 4 <i>a</i> |    | (2551.4)             | 45946                         | 3 <i>a</i> |    |
| 2473.8               | 46433                         | 2 <i>c</i> |    | (2552.4)             | 45940                         | 3 <i>a</i> |    |
| 2474.6               | 46428                         | 4 <i>b</i> |    | (2552.6)             | 45938                         | 1 <i>b</i> |    |
| 2475.5               | 46424                         | 1 <i>c</i> |    | 2553.6               | 45932                         | 3 <i>a</i> |    |
| 2477.4               | 46411                         | 2 <i>a</i> |    | 2554.0               | 45929                         | 3 <i>a</i> |    |
| 2477.8               | 46408                         | 2 <i>a</i> |    |                      |                               |            |    |

TABLE (continued).

| Kirchhoff's measure. | Wave-length,<br>m.m.<br>0.000 |            |    | Kirchhoff's measure. | Wave-length,<br>m.m.<br>0.000 |            |          |
|----------------------|-------------------------------|------------|----|----------------------|-------------------------------|------------|----------|
| (2554.9              | 45922                         | 3 <i>a</i> |    | 2624.1               | 45428                         | 1 <i>b</i> |          |
| (2555.1              | 45921                         | 2 <i>c</i> |    | 2625.2               | 45419                         | 5 <i>a</i> |          |
| 2556.3               | 45913                         | 2 <i>c</i> |    | 2625.9               | 45413                         | 4 <i>a</i> |          |
| 2559.9               | 45890                         | 3 <i>b</i> |    | 2626.3               | 45410                         | 2 <i>a</i> |          |
| 2562.1               | 45875                         | 4 <i>b</i> |    | 2627.0               | 45405                         | 5 <i>b</i> |          |
| 2564.0               | 45862                         | 3 <i>b</i> |    | 2627.9               | 45398                         | 2 <i>a</i> |          |
| 2565.0               | 45855                         | 6 <i>c</i> |    | 2628.9               | 45391                         | 1 <i>c</i> |          |
| 2565.9               | 45848                         | 2 <i>b</i> |    | 2629.7               | 45386                         | 1 <i>b</i> |          |
| 2566.3               | 45845                         | 3 <i>d</i> |    | 2630.5               | 45380                         | 1 <i>a</i> |          |
| 2567.8               | 45836                         | 3 <i>b</i> |    | 2633.6               | 45356                         | 2 <i>c</i> |          |
| 2568.4               | 45832                         | 2 <i>b</i> |    | 2634.4               | 45351                         | 1 <i>d</i> |          |
| 2574.4               | 45790                         | 5 <i>c</i> |    | 2635.5               | 45343                         | 3 <i>b</i> |          |
| 2579.3               | 45756                         | 3 <i>d</i> |    | 2636.4               | 45337                         | 2 <i>c</i> |          |
| 2581.0               | 45744                         | 1 <i>a</i> |    | 2637.4               | 45329                         | 4 <i>b</i> |          |
| 2581.5               | 45740                         | 1 <i>a</i> |    | (2638.5              | 45320                         | 4 <i>e</i> | Ca       |
| 2582.0               | 45737                         | 2 <i>a</i> |    | (2638.8              | 45318                         | 5 <i>a</i> |          |
| 2582.4               | 45733                         | 2 <i>a</i> |    | 2639.6               | 45313                         | 1 <i>c</i> |          |
| 2582.8               | 45730                         | 1 <i>a</i> |    | 2640.6               | 45305                         | 2 <i>c</i> |          |
| 2584.0               | 45721                         | 3 <i>e</i> |    | 2641.6               | 45297                         | 3 <i>c</i> |          |
| 2585.4               | 45712                         | 5 <i>b</i> |    | 2642.5               | 45291                         | 2 <i>a</i> |          |
| 2587.9               | 45694                         | 3 <i>a</i> |    | 2643.2               | 45287                         | 1 <i>a</i> |          |
| 2588.5               | 45690                         | 5 <i>b</i> |    | 2643.5               | 45285                         | 1 <i>a</i> |          |
| 2589.7               | 45681                         | 1 <i>b</i> |    | 2645.6               | 45268                         | 4 <i>b</i> |          |
| 2591.3               | 45669                         | 4 <i>a</i> |    | 2646.2               | 45263                         | 2 <i>g</i> | (La, Di) |
| 2591.7               | 45666                         | 2 <i>c</i> |    | (2650.5              | 45233                         | 5 <i>b</i> | Ca       |
| 2593.0               | 45656                         | 1 <i>c</i> |    | 2650.7               | 45231                         | 3 <i>c</i> |          |
| 2594.9               | 45643                         | 2 <i>b</i> |    | (2652.9              | 45213                         | 1 <i>d</i> |          |
|                      |                               | 1          |    | (2653.2              | 45211                         | 5 <i>b</i> | Ca       |
| 2595.4               | 45640                         | 4 <i>a</i> |    | from (2656.7         | 45185                         | 1          |          |
| 2595.9               | 45636                         | 4 <i>a</i> |    | (2657.9              | 45177                         | 3 <i>b</i> |          |
|                      |                               | 1          |    | 2658.6               | 45171                         | 1 <i>b</i> |          |
| 2596.4               | 45632                         | 2 <i>c</i> |    | 2664.9               | 45119                         | 3 <i>a</i> |          |
| 2597.7               | 45622                         | 3 <i>b</i> |    | 2665.9               | 45109                         | 3 <i>b</i> |          |
| 2598.5               | 45617                         | 1 <i>b</i> |    | 2666.7               | 45102                         | 1 <i>b</i> |          |
| (2599.4              | 45611                         | 3 <i>c</i> |    | 2667.6               | 45094                         | 3 <i>a</i> |          |
| 2599.7               | 45609                         | 5 <i>b</i> |    | 2668.0               | 45091                         | 1 <i>b</i> |          |
| 2600.6               | 45602                         | 2 <i>a</i> |    | 2669.4               | 45079                         | 3 <i>b</i> |          |
| 2601.0               | 45599                         | 2 <i>c</i> |    | <i>f</i> * 2670.0    | 45074                         | 6 <i>e</i> | Fe       |
| 2602.1               | 45590                         | 4 <i>b</i> |    | 2673.8               | 45042                         | 1 <i>a</i> |          |
| 2602.9               | 45583                         | 1 <i>a</i> |    | 2674.5               | 45036                         | 2 <i>a</i> |          |
| 2603.6               | 45577                         | 2 <i>b</i> |    | 2675.6               | 45026                         | 2 <i>c</i> |          |
| 2604.0               | 45574                         | 1 <i>a</i> |    | 2676.5               | 54018                         | 2 <i>a</i> |          |
| 2604.8               | 45568                         | 4 <i>b</i> |    | 2677.2               | 45011                         | 1 <i>a</i> |          |
| (2605.8              | 45561                         | 3 <i>b</i> |    | 2678.4               | 45001                         | 1 <i>a</i> |          |
|                      |                               | 2          |    | 2679.0               | 44996                         | 2 <i>a</i> |          |
| 2606.6               | 45555                         | 5 <i>c</i> | Ca | (2680.0              | 44988                         | 5 <i>b</i> |          |
| 2607.1               | 45551                         | 3 <i>c</i> |    | (2680.2              | 44986                         | 3 <i>b</i> |          |
| 2608.2               | 45543                         | 1 <i>c</i> |    | 2681.2               | 44977                         | 5 <i>a</i> |          |
| 2608.6               | 45540                         | 1 <i>b</i> |    | 2683.1               | 44961                         | 4 <i>b</i> |          |
| 2608.9               | 45538                         | 1 <i>a</i> |    | (2686.0              | 44936                         | 3 <i>c</i> |          |
| 2610.2               | 45529                         | 1 <i>a</i> |    | (2686.4              | 44933                         | 6 <i>f</i> | Fe       |
| 2612.3               | 45514                         | 3 <i>b</i> |    | (2686.8              | 44930                         | 3 <i>e</i> |          |
| 2613.6               | 45504                         | 2 <i>c</i> |    | 2688.4               | 44915                         | 2 <i>e</i> |          |
| 2614.1               | 45501                         | 3 <i>c</i> |    | (2690.8              | 44894                         | 5 <i>b</i> |          |
| 2616.5               | 45486                         | 2 <i>b</i> |    | 2691.1               | 44890                         | 3 <i>e</i> |          |
| 2619.1               | 45467                         | 5 <i>b</i> |    | 2692.3               | 44881                         | 3 <i>c</i> |          |
| 2619.9               | 45461                         | 3 <i>a</i> |    | 2693.5               | 44871                         | 4 <i>c</i> |          |
| 2620.3               | 45458                         | 3 <i>a</i> |    | from 2695.2          | 44855                         | } 1        |          |
| 2622.3               | 45443                         | 1 <i>b</i> |    | to 2696.8            | 44841                         |            |          |

\* The identification of *f* appears doubtful.—G. B. A.

TABLE (continued).

| Kirchhoff's measure. | Wave-length,<br>m.m.<br>0.000 |            |         | Kirchhoff's measure. | Wave-length,<br>m.m.<br>0.000 |            |            |  |
|----------------------|-------------------------------|------------|---------|----------------------|-------------------------------|------------|------------|--|
| from 2698.2          | 44830                         | 1 <i>f</i> |         | 2755.4               | 44291                         | 1 <i>b</i> |            |  |
| (2699.8              | 44816                         | 1          |         | 2755.8               | 44287                         | 2 <i>b</i> |            |  |
| 2700.7               | 44810                         | 2 <i>a</i> |         | 2756.5               | 44279                         | 1 <i>c</i> |            |  |
| (2702.1              | 44799                         | 3 <i>b</i> |         | 2757.2               | 44272                         | 1 <i>c</i> |            |  |
| (2702.3              | 44797                         | 4 <i>a</i> |         | 2759.4               | 44249                         | 1 <i>a</i> |            |  |
| (2702.5              | 44794                         | 3 <i>b</i> |         | 2760.1               | 44242                         | 2 <i>a</i> |            |  |
| 2703.5               | 44786                         | 3 <i>a</i> |         | 2760.6               | 44236                         | 2 <i>d</i> |            |  |
| from 2703.8          | 44783                         | } 1        |         | 2762.0               | 44221                         | 4 <i>e</i> |            |  |
| to 2704.9            | 44773                         |            |         | 2763.8               | 44202                         | 3 <i>f</i> |            |  |
| (2707.4              | 44751                         | 1 <i>f</i> |         | 2767.2               | 44166                         | 1 <i>d</i> |            |  |
| (2707.7              | 44748                         | 3 <i>a</i> |         | 2768.2               | 44155                         | 2 <i>a</i> |            |  |
| 2708.9               | 44737                         | 4 <i>b</i> |         | 2768.5               | 44152                         | 1 <i>a</i> |            |  |
| 2709.6               | 44731                         | 2 <i>b</i> |         | 2770.0               | 44136                         | 2 <i>b</i> |            |  |
| (2710.6              | 44722                         | 3 <i>a</i> |         | 2770.8               | 44128                         | 2 <i>b</i> |            |  |
| (2710.9              | 44719                         | 1 <i>g</i> |         | 2774.0               | 44095                         | 5 <i>c</i> |            |  |
| 2711.9               | 44711                         | 1 <i>a</i> |         | (2775.4              | 44081                         | 4 <i>c</i> |            |  |
| 2712.8               | 44702                         | 2 <i>a</i> |         | (2775.7              | 44077                         | 6 <i>c</i> |            |  |
| 2713.3               | 44697                         | 3 <i>a</i> |         | (2776.0              | 44073                         | 4 <i>c</i> |            |  |
| 2714.3               | 44688                         | 2 <i>a</i> |         | (2777.3              | 44059                         | 3 <i>a</i> |            |  |
| 2715.2               | 44681                         | 2 <i>b</i> |         | (2777.8              | 44054                         | } 2        |            |  |
| 2716.1               | 44673                         | 1 <i>d</i> |         |                      |                               |            |            |  |
| 2718.5               | 44650                         | 3 <i>g</i> |         |                      |                               | 1          |            |  |
| (2719.0              | 44646                         | 4 <i>c</i> |         | 2778.5               | 44047                         |            |            |  |
|                      |                               | 1          |         | 2781.2               | 44019                         | 2 <i>b</i> |            |  |
| (2720.2              | 44635                         | } 2        | Fe      | 2782.2               | 44008                         | 1 <i>b</i> |            |  |
| 2720.8               | 44629                         |            |         | } 6                  | 2782.9                        | 44001      | 3 <i>b</i> |  |
| 2721.6               | 44622                         |            |         |                      | 2783.9                        | 43990      | 1 <i>b</i> |  |
| 2722.8               | 44611                         | } 3        |         | (2784.8              | 43981                         | 1 <i>c</i> |            |  |
| (2725.5              | 44586                         |            |         | 2 <i>d</i>           | (2785.1                       | 43978      | 2 <i>c</i> |  |
| (2725.8              | 44582                         | 3 <i>a</i> |         | (2788.8              | 43939                         | 1 <i>b</i> |            |  |
| 2726.8               | 44572                         | 2 <i>a</i> | (2789.1 | 43936                | 3 <i>c</i>                    |            |            |  |
| 2728.0               | 44560                         | 4 <i>b</i> | 2790.5  | 43921                | 1 <i>c</i>                    |            |            |  |
| 2728.4               | 44557                         | 1 <i>b</i> | 2791.1  | 43915                | 3 <i>b</i>                    |            |            |  |
| 2729.8               | 44543                         | 2 <i>c</i> | 2793.0  | 43895                | } 1                           |            |            |  |
| 2730.7               | 44534                         | 1 <i>b</i> | 2794.0  | 43886                |                               |            |            |  |
| 2731.6               | 44526                         | 3 <i>c</i> | 2795.7  | 43868                | } 2                           |            |            |  |
| 2732.4               | 44518                         | 1 <i>c</i> | 2796.7  | 43857                |                               |            |            |  |
| 2733.7               | 44506                         | 5 <i>b</i> |         |                      | } 6                           |            |            |  |
| (2734.1              | 44502                         | 3 <i>b</i> |         | (2797.6              |                               | 43848      |            |  |
|                      |                               | 1          |         |                      |                               | 2          |            |  |
| 2735.7               | 44487                         | 3 <i>b</i> |         | (2798.0              | 43844                         | 3 <i>b</i> |            |  |
| 2736.5               | 44479                         | 3 <i>b</i> |         |                      |                               | 1          |            |  |
| 2736.9               | 44475                         | 3 <i>b</i> |         | 2798.9               | 43835                         | 2 <i>c</i> |            |  |
| 2737.4               | 44470                         | 1 <i>a</i> |         |                      |                               | 1          |            |  |
| 2737.8               | 44466                         | 2 <i>a</i> |         | (2799.5              | 43829                         | 2 <i>c</i> |            |  |
| 2739.2               | 44453                         | 2 <i>c</i> |         |                      |                               | 1          |            |  |
| 2739.9               | 44446                         | 1 <i>b</i> |         | 2800.1               | 43823                         | 3 <i>b</i> |            |  |
| 2741.3               | 44433                         | 3 <i>d</i> |         |                      |                               | 1          |            |  |
| 2741.7               | 44429                         | 3 <i>b</i> |         | (2800.7              | 43816                         | 3 <i>b</i> |            |  |
| (2743.8              | 44408                         | 1 <i>f</i> |         |                      |                               | 1          |            |  |
| (2744.1              | 44406                         | 4 <i>c</i> |         | 2801.4               | 43807                         | 4 <i>d</i> |            |  |
| (2744.3              | 44404                         | 1 <i>d</i> |         | 2804.5               | 43771                         | 1 <i>b</i> |            |  |
| 2746.8               | 44379                         | } 1        |         | 2805.4               | 43761                         | 1 <i>b</i> |            |  |
| (2747.2              | 44374                         |            |         | 2806.9               | 43743                         | 1 <i>c</i> |            |  |
| (2747.6              | 44370                         |            |         | 2807.2               | 43739                         | 2 <i>a</i> |            |  |
| 2748.0               | 44367                         | 3 <i>a</i> |         | (2808.6              | 43723                         | 1 <i>b</i> |            |  |
| 2749.8               | 44350                         | 4 <i>c</i> |         | (2808.8              | 43721                         | 2 <i>a</i> |            |  |
| 2750.6               | 44341                         | 3 <i>c</i> |         | (2809.0              | 43719                         | 1 <i>b</i> |            |  |
| 2754.5               | 44300                         | 3 <i>a</i> |         | 2810.8               | 43697                         | 2 <i>b</i> |            |  |
|                      |                               | 2 <i>c</i> |         |                      |                               |            |            |  |

| Kirchhoff's measure. | Wave-length,<br>m.m.<br>0.000 |     |    | Kirchhoff's measure. | Wave-length,<br>m.m.<br>0.000 |     |      |
|----------------------|-------------------------------|-----|----|----------------------|-------------------------------|-----|------|
| 2811.7               | 43687                         | 2 a |    | 2851.6               | 43202                         | 3 b |      |
| 2812.0               | 43683                         | 2 a |    |                      |                               | 2   |      |
| (2812.5              | 43678                         | 2 a |    | 2852.0               | 43197                         | 4 a |      |
| 2812.8               | 43675                         | 1 e |    |                      |                               | 2   |      |
| 2814.1               | 43659                         | 1 b |    | 2852.3               | 43193                         | 4 a |      |
| 2817.7               | 43615                         | 3 c |    |                      |                               | 1   |      |
| 2819.2               | 43598                         | 3 b |    | 2853.1               | 43181                         |     |      |
| 2819.6               | 43594                         | 2 b |    | 2853.6               | 43175                         | 3   |      |
| 2820.6               | 43582                         | 2   |    | 2854.1               | 43168                         | 4   |      |
| 2821.0               | 43578                         | 3   |    | G 2854.7             | 43160                         | 6   | } Fe |
| 2821.6               | 43571                         | 6   |    | 2855.2               | 43153                         | 4   | } Ca |
| 2822.3               | 43564                         |     | Fe | 2855.7               | 43146                         | 3   |      |
|                      |                               | 3   |    | 2856.9               | 43129                         | 4 d |      |
| 2823.4               | 43552                         | 4 c |    | from 2857.9          | 43118                         | 3   |      |
| 2824.2               | 43543                         | 3 a |    | 2858.5               | 43110                         | 4 a |      |
|                      |                               | 2   |    |                      |                               |     |      |
| 2825.0               | 43534                         | 4 c |    | 2858.9               | 43104                         | 2   |      |
|                      |                               | 3   |    |                      |                               |     |      |
| 2825.9               | 43523                         | 4 b |    | 2859.4               | 43098                         | 3   |      |
|                      |                               | 3   |    |                      |                               |     |      |
| 2826.5               | 43516                         | 4 e |    | 2860.2               | 43088                         | 1   |      |
| 2828.9               | 43488                         | 3 b |    | 2860.9               | 43078                         | 2   |      |
| 2830.7               | 43467                         | 3 g |    |                      |                               | 1   |      |
| 2834.2               | 43426                         | 5 c | Ca | 2861.7               | 43069                         | 4 b |      |
| 2837.7               | 43384                         | 1 g |    | 2861.9               | 43066                         | 3 b |      |
| 2841.4               | 43339                         | 5 b |    |                      |                               | 1   |      |
| 2841.7               | 43335                         | 4 e |    | 2863.1               | 43050                         | 3 b |      |
| 2843.0               | 43318                         | 3 d |    | 2863.6               | 43044                         |     |      |
| 2843.3               | 43314                         | 4 a |    |                      |                               | 4   |      |
| 2844.0               | 43304                         | 3 b |    | 2864.2               | 43036                         | 5 b |      |
| 2845.3               | 43286                         | 4 f |    |                      |                               | 2   |      |
|                      |                               | 2   |    | 2864.7               | 43030                         | 4 b | Ca   |
| 2846.1               | 43275                         | 3 c |    |                      |                               | 2   |      |
|                      |                               | 2   |    | 2865.3               | 43022                         | 4 c |      |
| 2846.9               | 43264                         | 4 c |    |                      |                               | 1   |      |
|                      |                               | 1   |    | 2866.3               | 43009                         | 5 b |      |
| 2847.7               | 43253                         | 4 a |    |                      |                               | 3   |      |
|                      |                               | 2   |    | 2867.1               | 42999                         |     |      |
| 2848.0               | 43249                         | 4 a |    |                      |                               | 2   |      |
|                      |                               | 2   |    | 2868.1               | 42985                         | 4 c |      |
| 2848.4               | 43243                         | 3 b |    |                      |                               | 3   |      |
|                      |                               | 2   |    | 2869.7               | 42964                         | 5 c | Ca   |
| 2848.9               | 43237                         | 3 b |    |                      |                               | 4   |      |
|                      |                               | 2   |    | 2871.2               | 42944                         |     |      |
| 2849.3               | 43232                         | 3 b |    | 2872.2               | 42930                         | 4 d |      |
|                      |                               | 2   |    |                      |                               | 1   |      |
| 2849.8               | 43225                         | 3 b |    | 2873.4               | 42913                         | 2 b |      |
|                      |                               | 2   |    |                      |                               | 1   |      |
| 2850.2               | 43221                         | 3 b |    | 2873.9               | 42907                         | 2 b |      |
|                      |                               | 2   |    |                      |                               | 1   |      |
| 2850.7               | 43214                         | 3 b |    | 2874.3               | 42901                         | 3 b |      |
|                      |                               | 2   |    |                      |                               | 1   |      |
| 2851.1               | 43209                         | 3 b |    | 2874.7               | 42897                         | 2 b |      |
|                      |                               | 2   |    |                      |                               | 1   |      |
|                      |                               |     |    | 2875.2               | 42890                         | 4 c |      |

Conversion of KIRCHHOFF'S Spectral Measures into Wave-Lengths in terms of the Millimetre, for the lines produced by Metals and Air.

(The lines marked with an asterisk appear to coincide with dark lines in the Solar Spectrum.)—Note by KIRCHHOFF.

| Kirchhoff's measure. | Wave-length,<br>m.m.<br>0.000 |     | Kirchhoff's measure. | Wave-length,<br>m.m.<br>0.000 |     |
|----------------------|-------------------------------|-----|----------------------|-------------------------------|-----|
| Ce                   |                               |     | (La, Di)             |                               |     |
| 1190.1               | 56345                         | 1   | 1025.0               | 58693                         | 1   |
| 1249.9               | 55611                         | 1   | 1064.5               | 58080                         | 1   |
| 1256.7               | 55530                         | 1   | 1066.1               | 58058                         | 1   |
| 1329.1               | 54710                         | 2   | 1071.1               | 57979                         | 1   |
| 1332.4               | 54676                         | 2   | 1075.6               | 57915                         | 1   |
| 1336.2               | 54635                         | 1   | 1077.0               | 57895                         | 1   |
| 1385.0               | 54118                         | 2   | 1092.1               | 57674                         | 2   |
| 1401.7               | 53948                         | 2   | *1302.0              | 55012                         | 1   |
| *1438.9              | 53580                         | 3   | *1303.4              | 54995                         | 2   |
| 1460.9               | 53363                         | 1   | 1317.6               | 54836                         | 1   |
| 1517.9               | 52834                         | 3   | 1345.4               | 54537                         | 1   |
| from 1571.0          | 52364                         | } 1 | from 1486.8          | 53121                         | } 2 |
| to 1572.4            | 52351                         |     | *to 1489.2           | 53098                         |     |
| 1573.0               | 52345                         | 2   | *1622.3              | 51925                         | 1   |
| 1623.1               | 51918                         | 1   | *1623.3              | 51916                         | 1   |
| from 1629.2          | 51866                         | } 2 | 1716.6               | 51167                         | 2   |
| to 1630.4            | 51858                         |     | 1728.8               | 51072                         | 2   |
| 1683.1               | 51427                         | 1   | from 1894.5          | 49873                         | } 2 |
| 1725.5               | 51098                         | 1   | *to 1895.2           | 49869                         |     |
| *1777.5              | 50705                         | 2   | 1903.0               | 49816                         | 1   |
| from 1782.4          | 50669                         | } 1 | 1940.2               | 49569                         | 1   |
| to 1784.5            | 50650                         |     | from 1988.6          | 49255                         | } 1 |
| 1938.8               | 49579                         | 2   | to 1989.5            | 49250                         |     |
| 2052.3               | 48856                         | 1   | 2003.8               | 49156                         | 1   |
| 2221.5               | 47871                         | 1   | 2004.7               | 49151                         | 2   |
| Di                   |                               |     | 2031.0               | 48987                         | 2   |
| 1225.0               | 55908                         | 2   | 2081.0               | 48682                         | 2   |
| 1230.0               | 55847                         | 1   | 2121.4               | 48444                         | 1   |
| from 1364.5          | 54335                         | } 1 | 2208.2               | 47948                         | 2   |
| to 1365.2            | 54327                         |     | 2214.5               | 47912                         | 2   |
| 1431.9               | 53648                         | 1   | 2217.8               | 47894                         | 2   |
| 1471.1               | 53269                         | 1   | Pd                   |                               |     |
| from 1518.6          | 52828                         | } 1 | 1114.7               | 57349                         | 1   |
| *to 1519.4           | 52820                         |     | *1146.2              | 56921                         | 2   |
| 1536.0               | 52675                         | 1   | 1164.9               | 56670                         | 2   |
| 1541.4               | 52622                         | 1   | 1185.6               | 56403                         | 1   |
| 1548.9               | 52555                         | 2   | 1264.6               | 55438                         | 2   |
| *1567.5              | 52392                         | 1   | 1269.0               | 55386                         | 2   |
| 1709.2               | 51224                         | 2   | 1279.1               | 55270                         | 1   |
| La                   |                               |     | from 1400.0          | 53965                         | } 2 |
| from 1411.6          | 53851                         | } 2 | *to 1400.7           | 53959                         |     |
| *to 1412.8           | 53839                         |     | 1430.1               | 53666                         | 1   |
| 1416.8               | 53798                         | 2   | 1447.0               | 53504                         | 1   |
| 1451.0               | 53462                         | 1   | 1477.0               | 53212                         | 1   |
| 1606.8               | 52056                         | 2   | 1495.2               | 53042                         | 3   |
| 1627.9               | 51878                         | * 2 | 1540.0               | 52636                         | 1   |
| 1634.8               | 51821                         | 2   | from 1566.5          | 52401                         | } 2 |
| 2136.8               | 48352                         | 1   | to 1567.1            | 52396                         |     |
|                      |                               |     | 1601.4               | 52103                         | 1   |

TABLE (continued).

| Kirchhoff's measure. | Wave-length,<br>m.m.<br>0.000 |     | Kirchhoff's measure. | Wave-length,<br>m.m.<br>0.000 |     |
|----------------------|-------------------------------|-----|----------------------|-------------------------------|-----|
| from 1660.0          | 51613                         | } 3 | from 1488.2          | 53108                         | } 3 |
| to 1660.7            | 51608                         |     | to 1489.0            | 53100                         |     |
| 1732.9               | 51040                         |     | 1576.8               | 52313                         |     |
| 1801.9               | 50525                         | 1   | from 1806.1          | 50494                         | } 2 |
| 2062.0               | 48795                         | 2   | *to 1806.9           | 50488                         |     |
| 2123.6               | 48432                         | 2   | 2057.0               | 48826                         |     |
| 2162.0               | 48212                         | 2   |                      |                               | 1   |
| Pt                   |                               |     | (Ru, Ir)             |                               |     |
| 1325.7               | 54747                         | 1   | 1348.3               | 54504                         | 2   |
|                      |                               |     | *1489.9              | 53093                         | 1   |

## Atmospheric Lines.

| Kirchhoff's measure. | Wave-length,<br>m.m.<br>0.000 |  | Kirchhoff's measure. | Wave-length,<br>m.m.<br>0.000 |  |
|----------------------|-------------------------------|--|----------------------|-------------------------------|--|
| 711.4                | 65232                         |  | 977.7                | 59471                         |  |
| 948.0                | 59991                         |  | 982.0                | 59401                         |  |
| 949.4                | 59967                         |  | 982.3                | 59396                         |  |
| 949.8                | 59960                         |  | 988.9                | 59284                         |  |
| 951.7                | 59925                         |  | 989.2                | 59279                         |  |
| 954.2                | 59881                         |  | 989.6                | 59272                         |  |
| 958.8                | 59801                         |  | 993.1                | 59215                         |  |
| 959.6                | 59788                         |  | 993.4                | 59206                         |  |
| 961.9                | 59746                         |  | 998.1                | 59130                         |  |
| 963.7                | 59713                         |  | 999.2                | 59112                         |  |
| 964.4                | 59703                         |  | 1000.0               | 59099                         |  |
| 965.7                | 59681                         |  | 1001.4               | 59078                         |  |
| 968.7                | 59624                         |  | 1005.8               | 59004                         |  |
| 969.0                | 59623                         |  | 1008.3               | 58963                         |  |
| 969.6                | 59613                         |  | 1009.2               | 58949                         |  |
| 970.5                | 59597                         |  | 1010.5               | 58927                         |  |
| 972.1                | 59568                         |  | 1013.9               | 58873                         |  |
| 974.3                | 59531                         |  | 1015.1               | 58854                         |  |
| 975.0                | 59519                         |  | 1016.4               | 58833                         |  |
| 975.7                | 59505                         |  | 1017.7               | 58812                         |  |
| 976.1                | 59499                         |  | 1018.2               | 58803                         |  |
| 977.4                | 59477                         |  |                      |                               |  |

Measures of Wave-Lengths, in Millimetres, for the Spectral Lines produced by Air and different Metals: collected from the preceding Tables.

| Air.<br>m.m.<br>0-000 | Ba<br>m.m.<br>0-000 | Ca<br>m.m.<br>0-000 | Cr<br>m.m.<br>0-000 | Fe<br>m.m.<br>0-000 | La<br>m.m.<br>0-000 | Na<br>m.m.<br>0-000 | Pd<br>m.m.<br>0-000 |
|-----------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| 65729                 | 65035               | 43153               | 54112               | 54167               | 53851               | 59053               | 52396               |
| 65710                 | 61405               | 43030               | 52102               | 54121               | 53839               | 58988               | 52103               |
| 65690                 | 61086               | 42964               | 52077               | 54076               | 53798               |                     | 51613               |
| 65232                 | 58583               |                     | 52060               | 54063               | 53462               | Ni                  | 51608               |
| 64867                 | 57805               | Cd                  |                     | 53995               | 52056               | 61135               | 51040               |
| 60011                 | 55326               | 64456               | Cu                  | 53949               | 51878               | 61056               | 50525               |
| 59991                 | 55175               | 47469               | 57824               | 53862               | 51821               | 59017               | 48795               |
| 59967                 | 54262               |                     | 53024               | 53749               | 48352               | 58626               | 48432               |
| 59960                 | 49250               | Ce                  | 52215               | 53736               |                     | 54757               | 48212               |
| 59925                 | 48986               | 56345               | 51497               | 53713               |                     | 51754               |                     |
| 59880                 | 46513               | 55611               | 50976               | 53685               | (La, Di)            | 51664               | Pt                  |
| 59801                 | 46262               | 55530               | 47269               | 53463               | 58693               | 51517               | 54747               |
| 59788                 | 46260               | 54710               |                     | 53454               | 58080               | 51421               | 53108               |
| 59746                 |                     | 54676               | Di                  | 53346               | 58058               | 51373               | 53100               |
| 59713                 |                     | 54635               | 55908               | 53343               | 57979               | 51317               | 52313               |
| 59703                 | Ca                  | 54118               | 55847               | 53309               | 57915               | 51084               | 50494               |
| 59681                 | 67273               | 53948               | 54335               | 53243               | 57895               | 50917               | 50488               |
| 59624                 | 65059               | 53580               | 54327               | 53113               | 57674               | 50912               | 48826               |
| 59623                 | 65000               | 53363               | 53648               | 52941               | 55012               | 50716               | 46021               |
| 59613                 | 64764               | 52834               | 53269               | 52919               | 54995               | 50712               |                     |
| 59597                 | 64695               | 52364               | 52828               | 52792               | 54836               | 50236               | (Ru, Ir)            |
| 59568                 | 64559               | 52351               | 52820               | 52782               | 54537               | 50054               | 63525               |
| 59531                 | 64456               | 52345               | 52675               | 52747               | 53121               | 49701               | 54504               |
| 59519                 | 61693               | 51918               | 52622               | 52375               | 53098               | 49662               | 53093               |
| 59505                 | 61617               | 51866               | 52555               | 52309               | 51925               | 49263               |                     |
| 59499                 | 61191               | 51858               | 52392               | 51925               | 51916               | 49129               | Sr                  |
| 59477                 | 60990               | 51427               | 51224               | 51915               | 51167               | 49020               | 64129               |
| 59471                 | 58626               | 51098               |                     | 51693               | 51072               | 48778               | 55320               |
| 59401                 | 55997               | 50704               | Fe                  | 51664               | 49873               | 48728               | 54805               |
| 59396                 | 55981               | 50669               | 64972               | 51647               | 49869               | 48646               | 43118               |
| 59284                 | 55951               | 50651               | 64049               | 51592               | 49816               | 48497               | 43110               |
| 59279                 | 55913               | 49579               | 63049               | 51343               | 49569               | 48484               | 43104               |
| 59272                 | 55868               | 48856               | 62317               | 51281               | 49255               | 48198               |                     |
| 59215                 | 55852               | 47871               | 61915               | 50063               | 49250               | 47998               | Zn                  |
| 59206                 | 55787               |                     | 61348               | 49433               | 49156               | 47715               | 63683               |
| 59130                 | 53536               | Co                  | 60659               | 49431               | 49151               | 47242               | 48357               |
| 59112                 | 52792               | 61191               | 60297               | 49169               | 48987               |                     | 47769               |
| 59099                 | 52739               | 54821               | 59234               | 49148               | 48682               | Pd                  | 47486               |
| 59078                 | 52725               | 53579               | 57616               | 49135               | 48444               | 57349               |                     |
| 59004                 | 52705               | 53568               | 56210               | 48923               | 47948               | 56921               |                     |
| 58963                 | 52701               | 53488               | 56129               | 48917               | 47912               | 56670               |                     |
| 58949                 | 51883               | 53479               | 55997               | 48820               | 47894               | 56403               |                     |
| 58927                 | 50302               | 52904               | 55833               | 48769               | 45263               | 55438               |                     |
| 58873                 | 48820               | 52770               | 55728               | 48764               |                     | 55386               |                     |
| 58854                 | 45561               | 52747               | 55696               | 48676               |                     | 55270               |                     |
| 58833                 | 45555               | 52401               | 55660               | 45074               | Li                  | 53965               |                     |
| 58812                 | 45551               | 48739               | 54626               | 44933               | 60990               | 53959               |                     |
| 58803                 | 45320               | 48379               | 54556               | 44629               |                     | 53666               |                     |
|                       | 45318               | 48239               | 54477               | 44622               |                     | 53504               |                     |
|                       | 45213               | 48155               | 54456               | 43564               | Mg                  | 53212               |                     |
| Au                    | 45211               | 47958               | 54351               | 43168               | 51826               | 53042               |                     |
| 62796                 | 43426               | 46744               | 54309               | 43160               | 51705               | 52636               |                     |
| 48239                 | 43160               | 46314               | 54250               |                     | 51647               | 52401               |                     |

Comparison of the Wave-Lengths found by ÅNGSTRÖM with the Wave-Lengths found in the preceding Tables.

(For ÅNGSTRÖM'S measures, see POGGENDORFF'S 'Annalen der Physik und Chemie,' CXXIII. Band, page 498. ÅNGSTRÖM'S measures were originally given in terms of the Paris inch, but are here converted into measures in terms of the millimetre.)

| Designation of line<br>and Kirchhoff's<br>measure. | Wave-length,<br>by Ångström<br>in terms of<br>the Paris inch.<br>in.<br>0·0000 | Wave-length,<br>by Ångström<br>in terms of the<br>millimetre.<br>m.m.<br>0·000 | Wave-length,<br>computed in<br>preceding<br>Tables.<br>m.m.<br>0·000 | Designation of line<br>and Kirchhoff's<br>measure. | Wave-length,<br>by Ångström<br>in terms of<br>the Paris inch.<br>in.<br>0·0000 | Wave-length,<br>by Ångström<br>in terms of the<br>millimetre.<br>m.m.<br>0·000 | Wave-length,<br>computed in<br>preceding<br>Tables.<br>m.m.<br>0·000 |
|----------------------------------------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------|----------------------------------------------------------------------|----------------------------------------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------|----------------------------------------------------------------------|
| A 401·9—406·8                                      | 28120                                                                          | 76121                                                                          | 76561                                                                |                                                    | 1463·3                                                                         | 19696                                                                          | 53317                                                                |
| B 592·7—593·1                                      | 25397                                                                          | 68750                                                                          | 68841                                                                |                                                    | 1466·8                                                                         | 19681                                                                          | 53276                                                                |
| C 694·1                                            | 24263                                                                          | 65680                                                                          | 65710                                                                |                                                    | 1473·9                                                                         | 19653                                                                          | 53201                                                                |
| 849·7                                              | 22873                                                                          | 61917                                                                          | 61915                                                                | E {                                                | 1522·7                                                                         | 19484                                                                          | 52743                                                                |
| 860·2                                              | 22796                                                                          | 61709                                                                          | 61693                                                                |                                                    | 1523·7                                                                         | 19480                                                                          | 52732                                                                |
| 863·9                                              | 22768                                                                          | 61633                                                                          | 61617                                                                |                                                    | 1527·7                                                                         | 19468                                                                          | 52700                                                                |
| 874·3                                              | 22694                                                                          | 61433                                                                          | 61405                                                                |                                                    | 1564·2                                                                         | 19364                                                                          | 52418                                                                |
| 877·0                                              | 22677                                                                          | 61387                                                                          | 61348                                                                |                                                    | 1569·6                                                                         | 19346                                                                          | 52370                                                                |
| 884·9                                              | 22621                                                                          | 61235                                                                          | 61191                                                                |                                                    | 1622·3                                                                         | 19196                                                                          | 51964                                                                |
| 894·9                                              | 22551                                                                          | 61046                                                                          | 60990                                                                | b                                                  | 1633·5                                                                         | 19165                                                                          | 51880                                                                |
| D {                                                | 1002·8                                                                         | 21797                                                                          | 59004                                                                | b <sub>1</sub>                                     | 1648·8                                                                         | 19124                                                                          | 51769                                                                |
|                                                    | 1006·8                                                                         | 21775                                                                          | 58945                                                                | b <sub>2</sub> {                                   | 1653·7                                                                         | 19111                                                                          | 51733                                                                |
|                                                    | 1200·6                                                                         | 20761                                                                          | 56200                                                                |                                                    | 1655·6                                                                         | 19105                                                                          | 51717                                                                |
|                                                    | 1207·3                                                                         | 20713                                                                          | 56070                                                                | c                                                  | 1960·8                                                                         | 18327                                                                          | 49611                                                                |
|                                                    | 1217·8                                                                         | 20654                                                                          | 55910                                                                |                                                    | 2001·6                                                                         | 18191                                                                          | 49243                                                                |
| 1231·3                                             | 20601                                                                          | 55767                                                                          | 55833                                                                |                                                    | 2005·2                                                                         | 18184                                                                          | 49224                                                                |
| 1337·0                                             | 20169                                                                          | 54597                                                                          | 54626                                                                |                                                    | 2041·3                                                                         | 18083                                                                          | 48951                                                                |
| 1343·5                                             | 20136                                                                          | 54508                                                                          | 54556                                                                |                                                    | 2066·2                                                                         | 18011                                                                          | 48756                                                                |
| 1362·9                                             | 20073                                                                          | 54338                                                                          | 54351                                                                | F {                                                | 2079·5                                                                         | 17973                                                                          | 48653                                                                |
| 1367·0                                             | 20053                                                                          | 54283                                                                          | 54309                                                                |                                                    | 2080·5                                                                         |                                                                                | 48690                                                                |
| 1389·4                                             | 19984                                                                          | 54097                                                                          | 54076                                                                | f                                                  | 2670·0                                                                         | 16322                                                                          | 44184                                                                |
| 1390·9                                             | 19979                                                                          | 54083                                                                          | 54063                                                                |                                                    | 2686·4                                                                         | 16285                                                                          | 44083                                                                |
| 1421·5                                             | 19858                                                                          | 53756                                                                          | 53749                                                                |                                                    | 2720·8                                                                         | 16204                                                                          | 43864                                                                |
| 1423·0                                             | 19853                                                                          | 53742                                                                          | 53736                                                                | G                                                  | 2854·7                                                                         | 15923                                                                          | 43104                                                                |
| 1425·4                                             | 19842                                                                          | 53712                                                                          | 53713                                                                |                                                    |                                                                                |                                                                                | 43160                                                                |
| 1428·2                                             | 19835                                                                          | 53693                                                                          | 53685                                                                |                                                    |                                                                                |                                                                                |                                                                      |
| 1450·8                                             | 19742                                                                          | 53442                                                                          | 53463                                                                |                                                    |                                                                                |                                                                                |                                                                      |

Comparison of the Wave-Lengths found by DITSCHNEIDER with the Wave-Lengths found in the preceding Tables. (See 'Sitzungsberichte der Mathematisch-Naturwissenschaftlichen Classe der Kaiserlichen Akademie der Wissenschaften,' LII. Band, II. Abtheilung, 1865, p. 289, &c.)

| Designation<br>of line and<br>Kirchhoff's measure. | Wave-length,<br>by<br>Ditscheiner.<br>m.m.<br>0.000 | Wave-length,<br>computed in<br>preceding<br>Tables.<br>m.m.<br>0.000 | Designation<br>of line and<br>Kirchhoff's measure. | Wave-length,<br>by<br>Ditscheiner.<br>m.m.<br>0.000 | Wave-length,<br>computed in<br>preceding<br>Tables.<br>m.m.<br>0.000 |
|----------------------------------------------------|-----------------------------------------------------|----------------------------------------------------------------------|----------------------------------------------------|-----------------------------------------------------|----------------------------------------------------------------------|
| B 593                                              | 68833                                               | 68835                                                                | 1737.6                                             | 51180                                               | 51002                                                                |
| C 694                                              | 65711                                               | 65710                                                                | 1750.4                                             | 51068                                               | 50906                                                                |
| 711.5                                              | 65258                                               | 65233                                                                | 1777.4                                             | 50879                                               | 50729                                                                |
| 719.5                                              | 65054                                               | 65011                                                                | 1799                                               | 50729                                               | 50546                                                                |
| 783.5                                              | 63472                                               | 63403                                                                | 1834                                               | 50493                                               | 50295                                                                |
| 831                                                | 62407                                               | 62317                                                                | 1854.5                                             | 50363                                               | 50149                                                                |
| 850                                                | 62009                                               | 61915                                                                | 1867                                               | 50264                                               | 50063                                                                |
| 860                                                | 61796                                               | 61693                                                                | 1873.5                                             | 50205                                               | 50018                                                                |
| 864                                                | 61719                                               | 61617                                                                | 1885.8                                             | 50145                                               | 49933                                                                |
| 874.5                                              | 61520                                               | 61405                                                                | 1908.5                                             | 50010                                               | 49778                                                                |
| 877                                                | 61470                                               | 61348                                                                | 1920                                               | 49914                                               | 49701                                                                |
| 885                                                | 61322                                               | 61191                                                                | 1961                                               | 49653                                               | 49432                                                                |
| 895                                                | 61128                                               | 60990                                                                | 1975.6                                             | 49541                                               | 49337                                                                |
| 959                                                | 59859                                               | 59801                                                                | 1983                                               | 49471                                               | 49289                                                                |
| D $\delta$ 1002.8                                  | 59053                                               | 59053                                                                | 1989.5                                             | 49412                                               | 49250                                                                |
| D $\alpha$ 1006.8                                  | 58989                                               | 58988                                                                | 2002                                               | 49269                                               | 49169                                                                |
| 1029.4                                             | 58670                                               | 58626                                                                | 2018                                               | 49178                                               | 49068                                                                |
| 1096.1                                             | 57716                                               | 57616                                                                | 2041.4                                             | 48990                                               | 48923                                                                |
| 1103                                               | 57621                                               | 57517                                                                | 2058                                               | 48854                                               | 48820                                                                |
| 1135                                               | 57193                                               | 57068                                                                | 2067                                               | 48791                                               | 48764                                                                |
| 1155.7                                             | 56913                                               | 56790                                                                | F 2080.1                                           | 48687                                               | 48689                                                                |
| 1174.4                                             | 56676                                               | 56550                                                                | 2103.3                                             | 48499                                               | 48552                                                                |
| 1200.4                                             | 56339                                               | 56210                                                                | 2119.8                                             | 48317                                               | 48456                                                                |
| 1207.5                                             | 56240                                               | 56129                                                                | 2148.9                                             | 48092                                               | 48282                                                                |
| 1218                                               | 56119                                               | 55997                                                                | 2157.4                                             | 47991                                               | 48237                                                                |
| 1231.6                                             | 55955                                               | 55833                                                                | 2160.6                                             | 47959                                               | 48219                                                                |
| 1242.5                                             | 55819                                               | 55696                                                                | 2187.1                                             | 47717                                               | 48069                                                                |
| 1280                                               | 55368                                               | 55259                                                                | 2201.9                                             | 47626                                               | 47983                                                                |
| 1303.7                                             | 55154                                               | 54994                                                                | 2221.7                                             | 47470                                               | 47871                                                                |
| 1307                                               | 55111                                               | 54958                                                                | 2233.7                                             | 47371                                               | 47803                                                                |
| 1324.8                                             | 54854                                               | 54757                                                                | 2250                                               | 47161                                               | 47712                                                                |
| 1337                                               | 54719                                               | 54626                                                                | 2264.3                                             | 47106                                               | 47638                                                                |
| 1343.5                                             | 54646                                               | 54556                                                                | 2309                                               | 46742                                               | 47385                                                                |
| 1351.3                                             | 54549                                               | 54477                                                                | 2416                                               | 46097                                               | 46780                                                                |
| 1367                                               | 54382                                               | 54309                                                                | 2436.5                                             | 45901                                               | 46660                                                                |
| 1389.6                                             | 54132                                               | 54076                                                                | 2457.5                                             | 45714                                               | 46537                                                                |
| 1410.5                                             | 53919                                               | 53862                                                                | 2467.4                                             | 45606                                               | 46472                                                                |
| 1421.6                                             | 53792                                               | 53749                                                                | 2489.4                                             | 45409                                               | 46339                                                                |
| 1451                                               | 53491                                               | 53463                                                                | 2537.1                                             | 45089                                               | 46042                                                                |
| 1463                                               | 53369                                               | 53345                                                                | 2547.2                                             | 45046                                               | 45976                                                                |
| 1492.5                                             | 53062                                               | 53070                                                                | 2566.3                                             | 44880                                               | 45845                                                                |
| 1506.5                                             | 52919                                               | 52941                                                                | 2606                                               | 44633                                               | 45555                                                                |
| 1515.5                                             | 52841                                               | 52855                                                                | 2627                                               | 44498                                               | 45408                                                                |
| E 1523.5                                           | 52783                                               | 52782                                                                | 2638.6                                             | 44418                                               | 45319                                                                |
| 1542                                               | 52638                                               | 52618                                                                | 2670                                               | 44222                                               | 45074                                                                |
| 1569.8                                             | 52413                                               | 52375                                                                | 2686.6                                             | 44121                                               | 44933                                                                |
| 1577.5                                             | 52349                                               | 52308                                                                | 2721.6                                             | 43908                                               | 44622                                                                |
| 1589.1                                             | 52236                                               | 52208                                                                | 2734.9                                             | 43813                                               | 44495                                                                |
| 1601.6                                             | 52171                                               | 52101                                                                | 2775.6                                             | 43600                                               | 44077                                                                |
| 1622.4                                             | 52006                                               | 51925                                                                | 2797                                               | 43466                                               | 43857                                                                |
| 1634                                               | 51912                                               | 51826                                                                | 2822.8                                             | 43314                                               | 43564                                                                |
| b 1648.8                                           | 51809                                               | 51705                                                                | G 2854.7                                           | 43170                                               | 43160                                                                |
| 1655.6                                             | 51754                                               | 51647                                                                | 2869.7                                             | 43070                                               | 42964                                                                |
| 1693.8                                             | 51503                                               | 51343                                                                |                                                    |                                                     |                                                                      |